

**Final Report
Management Audit of
Consolidated Edison Company of New York, Inc.**

**Public Version
Confidential Materials are Redacted**

Presented to:

***Public Service Commission
State of New York***

Presented by:

***The
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I. Introduction and Summary

The New York State Public Service Commission (NYPSC, or PSC), in Case 08-M-0152, ordered a comprehensive management audit of the Consolidated Edison Company of New York (CECONY) in accordance with Public Service Law, Section 66(19). Such audits are required to be performed at least once every five years for combination electric and gas utilities. The law also states that “the audit shall include, but not be limited to, an investigation of the company’s construction program planning in relation to the needs of its customers for reliable service and an evaluation of the efficiency of the company’s operations.”

Through a competitive bidding process, the PSC selected the Liberty Consulting Group (Liberty) to perform this audit. Liberty’s team of twelve experienced consultants began work in May 2008. The bulk of the research and analytical work was completed early in 2009. This report provides the results of Liberty’s analysis, including its conclusions regarding CECONY’s performance in the audit areas, and its recommendations intended for the benefit of customers.

A. Audit Scope

The scope of the audit was defined by the PSC in its Request for Proposals (RFP). The RFP specified eight basic elements:

- Corporate mission, objectives, goals and planning
- Long-term load forecasting
- Supply procurement
- Long-term system planning
- Capital and O&M budgeting
- Program and project planning and management
- Work management
- Performance and results measurement.

The PSC further characterized the scope as a “framework of a series of elements or functions that are generally sequential in nature that can be viewed as a flow diagram or feedback loop.” In response to this scope description, Liberty proposed the process illustrated in the flow diagram shown below. This diagram depicts the desired flow of activities associated with the construction program and the management of work. Supply procurement does not fit nicely into this flow; the diagram depicts it as a parallel pursuit.

Effective management begins with executive direction and planning – establishing the vision and goals for the company, providing suitable direction to the organization and putting oversight mechanisms in place to manage implementation. With such long-range objectives set, the planning process can develop strategies for achieving management’s direction. For purposes of this audit, the processes take place at both the corporate level and in System Planning. Once plans are in place, tactical implementation, which is covered by project management and work management in this audit, becomes key. And

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graph LR; A[corporate direction] --> B[strategic planning]; B --> C[tactical implementation]; C --> D[performance monitoring]
```

corporate direction →
strategic planning →
tactical implementation →
performance monitoring

finally, all of these tasks and their results are measured by an overall management information system that assures everything comes together. A feedback loop to the next planning iteration is also included.

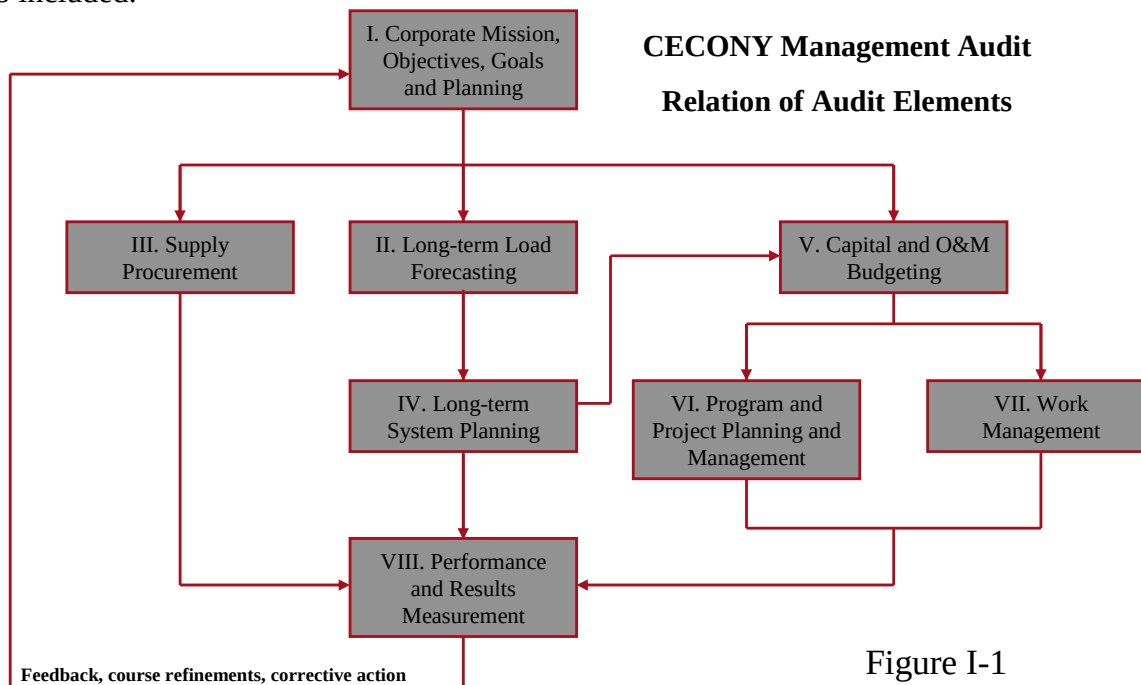


Figure I-1

Management audits can be conducted along organization lines (vertically) or along functional or process lines (horizontally). In this case, the PSC chose the latter. A process approach is especially important in highly structured organizations, which operate with what are often called “silos.” In such organizations, communications among various work departments (across the silos, or horizontally) can lessen the effectiveness of the company’s processes, and the process problems may not be visible from a local organizational perspective. CECONY can reasonably be characterized as a silo-type organization; therefore, a process viewpoint for this audit, as directed by the PSC, made sense. This is not intended as a criticism. Liberty does not believe that silo-type organizations are inherently bad, as many industry observers believe. Con Edison has chosen an organizational approach where there is considerable autonomy for the regional groups, and that generally equates to silos. Depending on how the approach is managed, such a decision can be fully appropriate for the organization in question. The silos demand a greater effort at coordination and integration by those charged with cross-functional leadership (executive management, project managers, etc.).

Comprehensive management audits are often far-reaching in their scope, essentially covering performance at all levels and in all functions of a company. Focused audits are more contained, and limit scope to specifically defined areas or more narrow questions. This audit is akin to a focused audit in that: (a) it has eight clearly defined elements of scope and (b) those eight elements are further focused on the construction program (with supply procurement as an exception).

CECONY provides electricity, natural gas, and steam utility services; the NYPSC provided guidance that all three businesses be covered in this audit with the proviso that the level of effort

should approximate the split of operating revenues, which are 76, 17 and 7 percent respectively. Liberty used consultants having specific knowledge and experience in the individual businesses and budgeted a level of effort consistent with the PSC's direction.

The table below shows the structure of this report and the location in which each RFP audit element is covered.

Chapter	RFP Audit Elements	Corporate mission, objectives, goals and planning	Long-term load fore- casting	Supply procure- ment	Long- term system planning	Capital and O&M budgeting	Program and project planning and management	Work manage- ment	Performance and results measurement
I. Introduction									
II. Audit Results Summary									
III. Corporate Planning									
IV. Oversight									
V. Compensation									
VI. Performance Measures									
VII. Load Forecasting									
VIII. System Planning–Elec									
IX. System Planning–Gas									
X. System Planning–Steam									
XI. Budgeting									
XII. Work Management									
XIII. Proj. Mgt. – Elec.									
XIV. Proj. Mgt. – Gas									
XV. Proj. Mgt. – Steam									
XVI. Electric Supply									
XVII. Gas Supply									

B. Audit Approach

Liberty has performed many management audits for many commissions, including the NYPSC. Liberty's proposal to the NYPSC suggested that the standard approach would not be sufficient for an audit of CECONY, and adjusted its proposal accordingly. Although all utilities say they are unique, it is no idle claim on the part of CECONY. The challenges facing the company are unmatched in the U.S. utility industry; the demands of its regulator, customers, and other stakeholders are similarly unique. High demands and high expectations are the watchwords for this utility, and the nature of its also-unique service territory makes such demands and expectations reasonable.

Coupling these characteristics with the reality of recent performance problems raises the stakes further and brings long-term reliability concerns into the picture, and reliability concerns mean more investment in infrastructure. CECONY now faces huge capital investments and that means higher rates, more regulatory scrutiny, and more stakeholder concern. Factors like these create a very difficult playing field and CECONY has clearly had difficulty in adapting to it.

1. A New Approach

Liberty concluded before submitting its proposal that treating this like “just another audit” would not serve the NYPSC, CECONY and its customers optimally. A number of different approaches were taken into consideration, including the types and skill-sets of the consultants, the proposed relationship with the Department of Public Service staff (Staff) and specifically defined objectives. The most important proposed change, however, was a shift in how the consultant and utility would work together. The “new”¹ concept was based on fundamental observations:

- This audit is costing CECONY and its customers over \$2 million².
- Should not management expect, and in fact demand, real tangible benefits as a result?
- If so, should not the company help in identifying where it wants improvements?

In Liberty’s view, with the Staff’s support, this concept is logical and further leads to logical implementing actions and attitudes. For example, a utility buying in to the concept would likely take many or all of the following steps:

- Direct its personnel to be open and forthcoming
- Provide the training to its personnel to help them reach that “open and forthcoming” goal
- Issue executive direction in support of the concept, stressing to employees its real benefits to the company and directing its full implementation
- Identify areas in which executive management would welcome the (free) consulting support
- Open a dialogue on how to best characterize and attack opportunities.

With active company participation, the concept has the potential to increase audit benefits. Because the company identifies, or helps identify, solutions, one would expect the implementation to proceed more smoothly and effectively. Perhaps most importantly from the company perspective, this process would give it an active voice in the management of the audit and a real opportunity to influence its outcome for the better.

At the kick-off to the audit, Liberty presented this concept to CECONY executives, and it was generally well received. However, at the same time, CECONY’s employees were being trained in how to respond to the auditors, and that training reflected the traditional “standard” approach to audits. Our experience is that such training instructs employees to respond only to the questions asked, bring nothing to the interview, and volunteer nothing. This is of course directly opposed to the recommended approach. As interviews evolved over the next few months, it became increasingly clear that employees were not directed in a manner to support the new approach, which meant that an opportunity had been lost from the start.

This turn of events was a disappointment to both Liberty and Staff; however, there are two positive outcomes that temper our disappointment. First, the company was indeed cooperative and it met all requirements for a regulatory audit without apparent hesitation or compromise. Measured by traditional audit standards, the company gets high marks for responsiveness.

¹ Although this approach may be new to New York and Con Edison, it has been implemented elsewhere.

² The cost of the consultants plus Con Edison’s internal costs to manage and support the audit.

CECONY dedicated substantial resources to the audit, provided information in a full and timely fashion, scheduled interviews promptly, and provided excellent logistical support.

Second, one sub-set of the new approach was partially successful, and led to several positive benefits. This subset became known as the “strawman process.” Liberty identified a number of potential major issues, precipitated dialog on them, and sought to work with the Company to develop mutually beneficial solutions. Some of the strawmen evolved successfully and some did not. However, they all precipitated a dialog that was beneficial to Liberty’s team, enabling them to better understand the issues. Hopefully, the agreed-upon solutions will have a much better chance of effective implementation, because they were crafted in cooperation with CECONY.

In summary, our approach produced benefits, but not nearly to the extent hoped. We nevertheless urge the NYPSC to not give up on this idea. Liberty would, however, suggest two major changes in any new initiative. First, gaining early CEO commitment is vital. Getting that commitment will take clear explanation of the concept in very explicit terms, including why it is evident that the company should make it work. We would then keep a path open to advise the CEO about the level of execution being demonstrated on that commitment as the audit progresses.

Second, we would request the training materials used by the company for orienting employees and would urge the company to modify those procedures if appropriate to be compatible with this approach.

2. Objectives

The key to any multi-organizational pursuit is a sharing of objectives, or at least an understanding and respect for the other party’s objectives. The new approach above creates such an environment; the traditional audit approach makes it more difficult.

In either case, Liberty felt it necessary to clearly articulate this project’s objectives and how we intended to carry them out. The figure illustrates them.

After scope definition in the RFP, this set of objectives was the next most defining aspect of the project. Liberty designed its approach and work plan around these objectives, and they guided the project direction throughout.

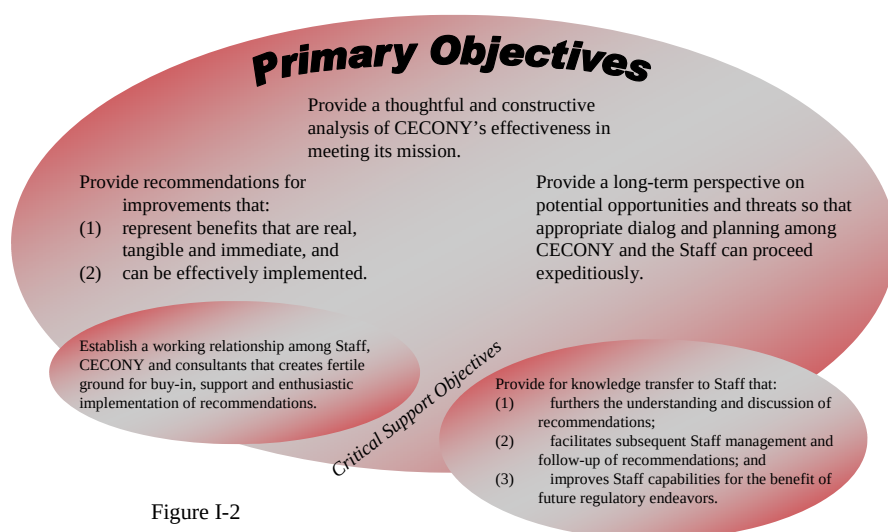


Figure I-2

3. Evaluation Criteria

For each of the audit elements, Liberty prepared evaluation criteria. The total number of criteria was well over 300; each has been addressed in the *Conclusions* sections of each report chapter. The criteria were developed by the consultants, based on their experiences in managing such work for utilities, conducting other management audits, and applying good management sense. Staff reviewed and approved all audit criteria and CECONY received the full list as part of the work plan for the audit.

4. Audit Plan

The PSC requires a detailed plan to be approved by Staff before extensive audit work begins. A further requirement for this project was a definitive reconciliation among all the documents describing audit scope, including the RFP, Liberty's proposal and the audit plan. It was further required that the reconciliation address both evaluation criteria and the hundreds of activities supporting the criteria. The 300+ criteria and the hundreds of activities formed the core of the "work plan." The audit plan contains the work plan plus project definition, project requirements, budget, resource plan and schedule.

5. Audit Process

After orientation and approval of the audit plan, consultants employed a discovery process in which data requests were submitted to CECONY. More than 1,000 data requests were processed and provided to consultants via a shared website. Consultant interviews of key CECONY personnel followed, with more than 300 conducted. Interviews included one or more consultants, the interviewee, a CECONY note-taker and, in many cases, one or more team members from Staff.

CECONY requested, and Liberty and Staff approved, the idea of having Company note-takers in each interview. In retrospect, this approval should have been conditioned on the "new" approach discussed above. Within that new approach, detailed interview notes would allow CECONY management to better follow developments and the direction of the auditors, allowing them to support that direction or suggest alternates. In the absence of that, it is not clear what purpose the notes serve. In fact, Liberty remains unaware of what benefit, if any, these notes provided for any party. In addition, if the direction to employees is to "be careful what you say," the note-takers can be seen as a monitor, with the clear message that management is watching. We would therefore recommend that the practice not be allowed in the absence of a commitment to a more open approach.

6. Staff Coordination

Liberty was committed to a strong team relationship with Staff and maintained continuous coordination with Staff team members. Staff was informed of all meetings and interviews and participated at their option. Technical consultation sessions were also held with other Staff personnel. These served to inform the Liberty consultants of current regulatory directions and details of past regulatory decisions. Liberty and PSC audit Staff were familiar with other PSC proceedings regarding CECONY, including a pending rate case. As a result, communications were rightly limited so as not to prejudice those proceedings with new, off-the-record information.

C. Executive Summary of Audit Results

Liberty's goal from the start was to be able to tell a clear story about CECONY's performance in the audit areas; a story that rises above the details and gives the NYPSC and CECONY management a global view of the key issues affecting performance, as well as the supporting details that allow a full understanding of issues and the means to fix them. Most importantly, we sought "root causes;" those issues that are at the core of the business activities examined and that drive performance. Too often, one tends to focus on the symptoms, not the root causes. When that happens in an audit like this one, today's problems tend simply to be replaced by a new set for the next audit. Only through dealing with the root causes can real, permanent improvements result.

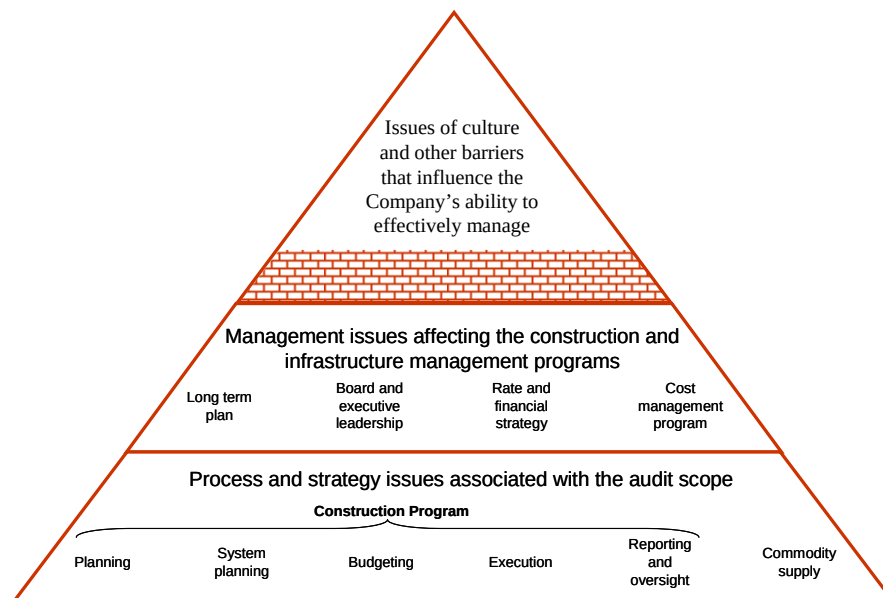


Figure I-3

The development of a logical story tracing all of the visible solutions or symptoms back to common sources is the key to audit success. Liberty believes that such a story has indeed emerged and that the foundation for real, permanent improvements is now on the table. Our story unfolds in three volumes, as pictured in the accompanying pyramid.

1. First Part of the Story: Barriers

The story begins with cultural and environmental issues that effectively define CECONY's way of managing its business and its ability to deal with the challenges it faces, both today and in the long-term. CECONY is constrained by a number of barriers that limit its ability to meet its mission. Further, we do not have confidence that the mode of operation resulting from the barriers is sustainable in the long-term, suggesting that CECONY's success will be a function of its ability to deal with these barriers.



Figure I-4

Liberty has defined four such barriers: cultural, regulatory, financial and environmental. Each is significant, but in concert they represent a potentially formidable force. These barriers are having a major impact on the company today and their ramifications for a viable, reliable, economic long-term electric system for New York are large. The barriers in general, and especially the financial barrier, raise the question of sustainability because they threaten the alignment of (1) infrastructure investment; (2) customer rates; and (3) return on investment. These critical parameters cannot be out of balance for an extended period if a utility is to fulfill its mission effectively, efficiently, and in accord with public requirements and expectations.

Some of the barriers are of CECONY's own making, some have been created by others and many are simply natural parts of the environment in which the company operates. Liberty does not believe that CECONY can attack the barriers alone, but there is no question that the company must provide leadership and commitment in this regard. After all, the Company has responsibility for managing and operating its business. Moreover, the company is suffering the most from the barriers and it will continue to do so in the future if the impediments remain.

CECONY needs to take responsibility and action, but will not succeed without help and leadership from the Commission. The problem is serious enough to merit top level attention and dedication, and Liberty recommends that such a joint effort be the next logical step.

The barriers span the major challenges facing the company, and will restrain any real improvement. Implementing individual recommendations in this report can produce benefits; just as such recommendations have done in the past through other, similar examinations. However, Liberty believes that benefits to the customer will be unduly limited and temporary unless the barriers are cleared. The success of the audit, but more importantly CECONY's future success, must therefore begin at the top of the pyramid. That is also where the toughest challenge resides. It is also where the biggest returns lie.

2. Second Part of the Story: Management Issues (and the Strawmen)

In the course of the audit, Liberty elevated certain matters because of their apparent high impact and necessity for executive level attention. These were referred to as the "strawmen". Liberty laid out preliminary findings and conclusions in these areas and asked CECONY to evaluate and respond to the Liberty hypotheses and, if appropriate, work together to better define the issues and seek beneficial solutions.

Each of these strawmen evolved and matured significantly as dialogue progressed. All have ended up in this report in one form or another. The report also states the degree to which each strawman received CECONY understanding, acceptance and buy-in. Of the approximately ten strawmen, four rose above other issues in their seeming importance and potential to produce real benefits for the customer and the company. The second level of the pyramid (Figure I-3) shows them; they form the second part of the story.

a. Long-term Planning and its Linkage to Results

No issue in this audit surfaced so quickly and from so many independent sources as the lack of an integrated vision or plan for the electric business across the long term. There are many reasons for this lack, not the least of which are the barriers, which in many ways constrain company efforts to think long-term. This is also an issue for which Staff expressed real concerns early in the process, particularly from the point of view of how the construction program flows from a long-term vision.

This was therefore an obvious choice for our first, and most critical, strawman. We concluded that the company has not been effective in justifying and communicating its capital investment needs, leaving those responsible for oversight, both internally and externally, in the difficult position of approving spending without a sufficiently clear sense of what customers gets for that investment. The company's explanations of spending are presented at a very detailed level and in technical jargon that make effective oversight impossible. While the company insisted that this was not the case, the facts demonstrate otherwise, and we are confident that neither the regulator nor CECONY's Board is provided what is necessary to make the best decisions on capital spending.

With Staff support, Liberty began with the premise that a clearly understandable linkage between capital spending and a future vision is required. That future vision should be quantified, with some measure of system reliability and adequacy. The company should then be in a position to link capital spending to the planned end result, and should also be able to discuss the impact of lesser spending. We have emphasized to CECONY management that this linkage question is of overriding importance; in fact, we have often characterized this issue as "linkage" and not "planning." In any event, the semantics should not hide the critical need to relate investment to planned results.

After lengthy discussions, CECONY eventually bought in to this concept, although the degree of understanding, acceptance and commitment must remain a matter for future determination, given the magnitude and complexity of the required solutions. A high level team has been put in place and is working towards resolution of this issue.

The linkage, or planning, issue is discussed in greater detail in Chapter III: *Corporate Planning*.

b. Board and Executive Leadership

The duties of Board members today have expanded greatly in a period of only a few years. Sarbanes-Oxley exemplifies new demands on directors' time and the tendency for new requirements to squeeze out some of the areas that traditionally received attention. With the many important challenges facing the Company, and the need for the Board to be involved in so many of those challenges, directors' responsibilities can quickly become overwhelming. Liberty cannot be critical of CECONY's Board, given their high level of effort and competence under these difficult conditions.

Notwithstanding that conclusion, Liberty believes that some added steps in overseeing the construction program will be appropriate for the Board. The program involves a multi-billion

dollar annual commitment with obvious rate impacts. We observed above that the quality of information given to the Board is not sufficient. Further, the Board's ability to understand subsequent management performance is not sufficient.

CECONY agreed that a heightened involvement by the Board in the planning process, budget approval and subsequent monitoring was appropriate. A series of actions were jointly developed in an attempt to meet the objectives without inappropriately burdening an already-busy Board.

This issue is discussed in further detail in Chapter IV: *Corporate Oversight*.

c. Rate and Financial Strategy

The Company in recent years has faced increased revenue requirements primarily attributable to an increased capital investment program and tax increases due in large part to the need to replace aging electric infrastructure. But the company has not been able to convince the NYPSC that it has identified its needs adequately and is therefore granted only partial relief that the Company considers inadequate. It therefore becomes essential to file again the next year, and the process is repeated in what becomes a continuous series of rate cases.

In this mode, financial planning becomes difficult and the rates granted determine the Company's level of spending. Accordingly, the rate making process supersedes the budgeting process or, in the words of CECONY managers "the rate case is the budget." Also, this mode results in the PSC essentially defining the company's annual operating and capital budgets.

CECONY sees this strawman as tightly linked to the planning issue, and believes that a solution to the planning issue could solve this concern as well. Although Liberty agrees that some linkage is indeed appropriate, we do not agree that resolution of the planning problem will automatically solve this issue. CECONY has also advanced the idea of multi-year rate agreements within the framework of a mutually agreeable long-term plan, and it will be appropriate for the company to take a leadership role in advancing such concepts.

d. Cost Management Program

Liberty concluded that CECONY has many good cost collection and reporting systems; however, we believe that adoption of a broader, more action-oriented approach to costs has the potential to produce major savings. Accordingly, Liberty recommends a shift to what we term a holistic approach to cost management, and CECONY has agreed with this approach.

Traditional cost management systems tend to be accounting oriented and focused on the reporting of historical costs. The approach recommended by Liberty makes a number of significant changes. First, cost is viewed holistically and becomes much more a part of the management fabric of a company. This is accomplished by a number of steps including:

- Creation of an organization and structure that establishes a place for cost in the hierarchy of priorities
- Integration of cost with the institutions that drive a company, such as compensation, training, performance measures, mission and values
- Definition of well designed policies and procedures that guide an effective program.

At the same time, a fundamental shift in how cost management is practiced is appropriate. This shift moves us away from numbers and reports and towards analysis and corrective action. The notion of a cost report being a “deliverable” and end result in itself is wrong, and is replaced by a vision where reports are a means to a more important end. Cost management becomes forward-looking (anticipatory) and proactive, as opposed to historical and reactive.

Based on CECONY’s written comments on the holistic approach and their subsequent actions, Liberty is confident that the CECONY program will move to a new level that will produce substantial customer benefits. The company’s response displays a level of understanding, commitment and enthusiasm that epitomizes the results we had hoped for in the audit as a whole. A senior team is now in place that is designing and implementing CECONY’s holistic approach and organizational and structural changes have already been made.

3. Third Part of the Story – Process and Strategy Issues

The third part of the story represents what might be characterized as the more typical audit findings. These are the detailed results of each consultant’s analysis and are summarized for each audit element and report chapter as follows:

a. Corporate Planning (Chapter III)

CECONY has an institutionalized annual planning process, and annual plans are developed as required at the business unit level. The Company does not distinguish between longer and shorter term plans, or identify a separate strategic planning process.

The guidelines for the planning process and the format and content of the annual plans are minimal, and the plans are not integrated. Thus, CECONY has 7 independent business plans for the operating units (electric Operations, Gas Operations, and the 5 operating units in Central Operations) rather than one coherent, integrated plan. Further, a number of activities that should be considered part of an integrated planning process are performed in various parts of the business units, but not included in the annual plans. The annual business plans are more of a communications tool provided to executive management rather than a working process to manage the Company.

CECONY typically operates in a reactive mode. External events, particularly incidents and accidents, are the primary drivers of its activities. Within the operating organizations, there appears to be an awareness of the major risks facing them, but the Company is unwilling or unable to get out in front of them. An overarching conclusion of this audit was that CECONY needs to develop a long range vision for its electric business, in order to provide a basis for defining long-term network goals, and to identify major system needs and long-term programs required to meet the network goals. Developing and then planning in accord with this vision will drive the adoption of more disciplined and value-added approaches to system investment. The Company needs to move with dispatch in making this enhancement to assure continued progress toward a sound vision and goals at expenditure levels that are sustainable. CECONY has already begun working on meeting this need.

b. Corporate Oversight (Chapter IV)

The CEI and CECONY boards have common membership and they operate in common. Liberty found the board members to be well-qualified and actively engaged when compared with other boards we have examined. The Board makes representative use of those committees that typically are the most involved in matters involving the construction program. The Operations Oversight and Environmental Health & Safety committees devote significant time to matters involving the operation of the service delivery assets and networks that result from construction activities.

The Operations Oversight committee in its short history has focused on responses to highly visible incidents. It should and has begun to seek out a role that will place it more “ahead of events.” The Board should also develop a more frequently exercised role in long-term plan creation and performance review. Providing more detailed, routine quantitative reports (a “dashboard” of key cost, schedule, and operating information) is also warranted. The board also needs to look at the interaction and overlap of roles among committees and rationalize them. These improvements will help to strengthen the oversight that the Board provides to CECONY construction program planning an execution. Finally, the Board finds itself at a critical juncture as retirement requirements serve to remove the members most experienced in utility operations. The board has acted to address that issue in part; it needs to remain “on the lookout” for replacing key skills, even as it addresses broader needs to promote personal excellence, breadth of talent, diversity, and other factors that contribute to an effective oversight body.

These improvement opportunities recognize that judging CECONY requires consideration of the factors that make its construction and O&M programs and expenditures unique:

- Current and expected expenditures are very high
- Territorial denseness and customer size and mix base make work performance complex
- Two other utility businesses (gas and steam), large in their own right, operate with an electricity business whose magnitude can cast a long shadow on how the other two are performing
- Stakeholders do not exhibit enough confidence in management’s ability to provide credible estimates of construction and operations needs and expenditures.

Such factors require that CECONY’s needs at the most senior level be examined against its own circumstances, not those of some composite, “average,” or typical utility. Clearing the hurdles that others have simply won’t be enough to make CECONY successful in the long run; if its hurdles are higher, it must bring greater skills to the arena in which it performs.

The roles and activities of the board, Internal Auditing, and the independent accountants collectively produce an effective overall approach to addressing the controls-related requirements of Sarbanes Oxley. Liberty’s scope excluded an examination of fraud prevention or detection programs and activities. We did assess controls related to assuring efficiency and effectiveness in construction program planning and execution. Key controls cover such issues in a manner that is commensurate with what we have observed elsewhere. We found the operations auditing program and resources to be a strength; however, we believe that CECONY has the staff ability and accordingly the opportunity (given the magnitude and complexity of its construction

program) to undertake examinations of effectiveness and efficiency, in addition to procedural-compliance examinations that have characterized much of their work to date.

c. Compensation (Chapter V)

The goal of Liberty's examination of incentive compensation was to evaluate how well it aligns personal incentives with performance and priorities.

CEI/CECONY incentive compensation elements generally display the standard elements. The long-term incentive program for management and directors is generally structured like that of other similar utilities. CEI/CECONY apply the long-term incentive awards strictly according to its objective measures; there has been no, "after-the-fact" resetting of targets.

There are, however, some design weaknesses. The annual bonus plan over-emphasizes the meeting of the O&M budget (through the combined impact of the two closely related metrics of net income is O&M expense). The lack of a direct measure that holds managers accountable for completing work programs allows them to stay within budget (and earn awards) by not getting budgeted work done. There should be a greater use of operational performance metrics for group and individual performance. Adding those measures will be difficult, because of the lack of uniformity in performance measures as one goes down through the organization.

Liberty also observed an unusual absence of formal performance reviews for officers. Such reviews are typically (and effectively) used by many to determine and substantiate executive awards. Moreover, the method used to set the size of the annual funds for distribution is overly complex. At the non-executive level of management, the percentages of salary at risk (subject to cash bonuses and long-term incentives) are low.

Liberty believes that the Company should make changes that will support achievement of important goals: (a) simplifying the plans, (b) restricting the high levels of discretion that can be exercised in the plans, (c) reducing the emphasis on O&M expense, (d) adding capital expenditure and operating performance measures.

The administration of CEI/CECONY incentive compensation programs is effective. The programs operate under adequately structured systems, processes, and documents. The board of directors gets sufficient information and has access to leading sources of outside expertise to oversee the design of incentive compensation programs, assess their competitiveness, and examine their administration. Reporting of progress against compensable goals and objectives is effective.

d. Performance Measures (Chapter VI)

CECONY identifies its Key Performance indicator system (KPI) as its performance measurement system. The KPI system was created in 2006 from a previous system of performance indicators, with the primary purpose of administering the Company's management variable pay compensation program. For the most part, it is short-term oriented. The system is available on CECONY's Intranet to all management-level employees, and they appear to pay close attention to it.

However, the KPI system does not comprise a robust management information system. CECONY does not have a comprehensive, corporate-wide integrated system of performance measurement and measures place insufficient emphasis on longer term performance. Business unit managers have their own sets of performance indicators to manage their units, which are typically combinations of reports put together to suit the needs of the managers. Generally, the Company has sufficient data and information for all of its operations and activities. As with planning, that data and information is disaggregated throughout the operating units and not assembled and compiled into a coherent, integrated system.

e. Load Forecasting (Chapter VII)

The load forecasting functions in CECONY are generally well-managed and of a good degree of sophistication. Staff personnel have excellent credentials and apply their knowledge well. Liberty sees several areas in which cost savings and process improvements may be possible. We have recommended a reevaluation of the load forecasting deliverables with the objective of better balancing the application of resources with the needs of the various forecast products.

We have stressed CECONY's long-term planning problems, so it should be no surprise that the load forecasting process is weak when judged for its long-term vision. Long-term planning and forecasting should be mutually supporting functions; but without an effective long-term planning process, a driving force is missing and load forecasting tends to be driven solely by financial and technical demands. Liberty has recommended an expanded long-term view of the forecasting function that should include consideration of various long-term scenarios as well as sensitivity and probabilistic studies of potential outcomes.

Liberty has also concluded that improvements are possible in the forecasting of gas requirements, and that current forecasts are too high. Recommendations have been offered to refine the forecasting process with the likelihood of a reduction in future capacity requirements.

On a more detailed note, Liberty has urged CECONY to integrate its load research program with the load forecasting process. There are likely to be cost-effective ways of expanding the load research program to provide valuable data for the forecasting process and hopefully allow CECONY to discontinue some of its more expensive methods such as surveys.

Liberty observed that the company's targeted DSM initiatives produce real benefits for deferral of new facilities; however, the numbers are small. Further, the company is unable to take advantage of curtailment programs already in place at the ISO, representing a lost opportunity that in many ways is already bought and paid for.

f. System Planning – Electric (Chapter VIII)

CECONY's practices and people in System Planning for the electric system are strong. There is a natural barrier to effective long-term transmission planning, however, as short-term generation alternatives tend to crowd out longer-term transmission options.

The standards applied in the system planning process are appropriate. Liberty reviewed CECONY's reliability criteria, design criteria and planning parameters and found all of them to

be adequate. We do recommend, however, that a base level of network reliability be established for new networks and considered in the reliability improvement program for existing networks. In seeking a linkage between investment and reliability, as we have strongly recommended elsewhere, such a parameter may be helpful. Also, it will be desirable to add a maintenance requirement in the planning standards for 138 kV and network systems that are designed to a single contingency.

Liberty believes there may be a good opportunity for peak load mitigation via loss reduction. System losses at the time of peak are very high, and mitigating measures could provide real benefits in the form of reduced demand and deferred investment.

Finally, Liberty finds that CECONY does not apply its vegetation management standards uniformly and suggests that managing the function centrally might be appropriate.

g. System Planning – Gas (Chapter IX)

The evaluation of the system planning function in gas produced a very positive assessment of the CECONY organization and its practices.

CECONY's gas planning processes should consider infrastructure needs for gas for electric generation in addition to the normal gas supply. It is important that the sizing of facilities and degree of investment correctly reflect the demands of each.

Liberty has also observed that the gas planning function would benefit from enhanced support from corporate planning functions. Major changes in the business environment should be a critical input to the system planning process, and planning at the corporate level is an appropriate source of that information.

h. System Planning – Steam (Chapter X)

Although Steam represents the smallest part of CECONY's business, the system faces many of the same infrastructure and planning issues that challenge electric and gas. The steam organizations are well-suited to handle these challenges and Liberty found no major deficiencies in the associated system planning functions.

There have been numerous reviews of the system and its operations such that the organization has been repeatedly tested and given opportunities for improvement. These appear to have been handled in a positive manner with a net benefit to the business.

Liberty does believe that a greater amount of attention can be paid to the distribution system in the planning process, which presently seems over-focused on supply. Bringing field realities associated with the distribution system more effectively into the planning process will provide for a stronger plan and more reliable and cost-effective system.

i. Budgeting (Chapter XI)

Budgeting is a central corporate process that establishes all spending plans and Board of Trustees authorizations for the next calendar year. CECONY's capital expenditure and operating expense

budgets have increased significantly in the past few years, resulting in the need for annual electric rate increases for the 2008 and 2009 rate years and beyond.

The company has most of the appropriate systems and processes in place to effect the development of annual budgets that combine the identification of system requirements from the bottom up. The company also has used top-down expenditure targeting in past years to provide spending caps and resulting financial discipline for the budgeting process.

The budgeting process has been stressed by CECONY's need for much higher spending levels, especially in the electric business, during the past few years. With increasing levels of electric expenditures, the rigor of budgeting has been compromised by what has become an annual rate case process, with that process effectively superseding budgeting. The budgeting process is also not designed to provide direct linkage to and progress toward meeting a long-term electric system vision and "master plan". The company also does not use long-term economic methods to justify and prioritize projects and allow the consistent allocation of limited funds between organizations and projects. Improved analysis also can provide better decision-making information that may be used by the Board of Trustees and shared with the commission and other stakeholders.

j. Work Management (Chapter XII)

Our evaluation concludes that CECONY is doing many things well in work management. There are good (but fragmented) tools and mechanisms available, especially relating to cost and productivity measurement. There is a good foundation from which to build, and the design and implementation of the recommended holistic cost management program is sure to pay major dividends and elevate an already-strong organization to best-in-class.

With respect to work planning, the Company generally earns high marks. The lack of an integrated work management system in Electric Operations is a major handicap. Nevertheless, the processes employed to define work and assign it to the field are good. While the cost elements of the work plans are generally good, there is a weakness in the degree of subsequent performance analysis against the cost plans and how deviations are managed.

There are numerous opportunities for improvement based on our analysis of resource management. Resource planning, particularly as it applies to long-term skill needs and changing work load, is a weakness, and further attention in this area can pay dividends. Management of overtime is also a weakness. Trends in this area are not good and the lack of appropriate response is a problem.

Liberty reviewed CECONY's safety efforts and observed a strong program, real management commitment and an aggressive Environment and Safety Committee. We are left with the contradiction of an apparently strong program with suitable executive support that has nonetheless produced an unacceptable result for 2008. Three fatalities, two of which involved electrical incidents, represent a tragic failure of the program.

Measures of performance relating to physical work are particularly strong at CECONY. There is an impressive catalog of productivity measures, including integration of the work breakdown

structure, person-hours and physical quantities installed. The multiple levels at which such data are available set the stage for what could be a very effective analytical capability.

On the negative side, those same measures are revealing some potentially bad news. Productivity trends have not been good, CECONY's targets are not aggressive and productivity is not a pay-for-performance goal for any of the business units. Quality trends are also weak in Electric Operations.

k. Project Management – Electric (Chapter XIII)

CECONY's capital budget has grown to over \$2 billion per year, an incredible amount of physical work by any standard. An obvious question is "have the Company's management capabilities and tools grown with the size of the capital budget?" That fundamental question is the centerpiece of our analysis of project management for electrical projects.

In CECONY's electric construction efforts, there are two major organizations, and the nature of their work, and their approach to project management, differ. In general, we give the first organization, Central Operations, high marks in their approach to project management. Specifically, this organization has taken many steps to elevate its skills, programs and capabilities to meet the heightened challenges of a massive capital program. We suggest that a more effective approach to resource planning will further help Central Operations, as will an expansion of their project management efforts into the management of ongoing programs.

The nature of the work in the second organization, Electric Operations, in some cases may not lend itself to project management approaches to the same degree as Central Operations. However, Liberty believes that CECONY is missing a real opportunity here. The principles of project management are indeed applicable in most elements of the work and the lack of such application at this time is apparent. It can be seen in project management efforts that are generally weak, lack dedicated project managers, are inconsistent among the regions, are lacking in cost management and are weak in scope control.

In general, Liberty believes a strong foundation exists in the Company for effective project management, and CECONY can achieve real savings by building on that foundation for improved programs in Electric Operations. Coupled with a strengthened approach to cost management, Liberty is optimistic that the Company can make some real gains here for the benefit of all of its stakeholders.

l. Project Management – Gas (Chapter XIV)

Gas transmission projects lend themselves to project management techniques and CECONY does employ such project management approaches in its work. There are numerous opportunities for improvement in the program, however, especially in scope control and cost management. Liberty recommends an improved and enhanced approach to scope documentation to include elements of risk, reward and alternate methods.

Gas distribution projects, on the other hand, make little use of project management principles, and that is a major shortcoming. There is no structured program and there are no dedicated project managers. CECONY has a major improvement opportunity here.

Our evaluation of gas project management also resurfaced the cultural barrier that has been observed several times in other parts of CECONY – an inward focus that prevents learning from others. The company believes that many of its challenges are unique, and there is certainly a basis for that belief. However, the Company often concludes from this that they have nothing to learn from others, and that is a serious mistake.

m. Project Management – Steam (Chapter XV)

Steam-related projects and programs are generally of shorter duration, smaller scope and routine in nature. This suggests that the application of sophisticated project management approaches is often not appropriate. Liberty generally concurs with the reduced focus on project management in the steam business, but nonetheless believes that the Company can benefit from a more formal and structured approach. Specifically, decisions on when and how to apply project management principles should be made on a formalized set of criteria. Further, Central Operations procedures relating to projects should be more specific in their instructions regarding steam projects. Finally, training in project management skills should empower managers associated with various steam projects.

n. Supply Procurement – Electric (Chapter XVI)

Several years after electric restructuring in New York State, CECONY is required to procure electricity for “full-service” customers that have not switched to a competitive supplier. The number of full-service customers and the electric volumes purchased by CECONY have gradually fallen with the migration of customers. Further customer erosion is expected in the future, given the upcoming requirement that more customers receive mandatory hourly pricing rather than full-service rates.

CECONY inherited as part of restructuring a number of large, legacy contracts with non-utility generators. The Company also signed at the then-prevailing market rates two longer-term contracts to serve the full-service load. The Company-owned East River steam/electric plant also provides a resource for meeting requirements. CECONY obtains the requirements remaining after these fixed resources from the marketplace through the NYISO, as anticipated by restructuring. The NYISO serves as a clearinghouse for electric capacity through auctions, and for energy and ancillary services through spot markets accessed by daily bidding.

The Company has generally procured electricity effectively, recognizing the burden of the NUGs and the resource and transmission constraints unique to New York City. As the restructured electric markets have evolved, however, CECONY has not been consistently diligent in monitoring and maintaining the optimum resource portfolio to serve full-service customers. The Company has not actively explored and pursued alternatives to its existing resource portfolio and NYISO purchases that may have been available in the marketplace. More active management of its electric supply resources is becoming even more important as the full-service load declines, and nears the level of legacy contractual obligations. Defining and developing an optimal, long-

term resource portfolio plan and related hedging to effectively meet the declining full-service load is a current and future challenge that the Company must meet.

o. Supply Procurement – Gas (Chapter XVII)

CECONY's gas supply function is well organized, and is staffed with well-qualified, capable people. Liberty found, however, that there is a need for Gas Supply to apply more recently developed approaches to capacity planning as it considers future commitments to gas-supply capacity projects.

Liberty also found improvement opportunities in capacity management. Gas Supply has not used its organizational connection to Electricity Supply to explore subjects of mutual interest. Also, returns from secondary-market activities are unacceptably low. Liberty presents recommendations in both of these areas.

II. Barriers to Success

A. Background

Liberty undertook this assignment with the realization that we were one of many outsiders brought in to examine CECONY. We understand that the many evaluations the Company has undergone make it difficult for employees yet again to “rise to the occasion.” Major incidents and events involving CECONY, such as the 2006 Long Island City (LIC) outage, invariably lead to another series of external reviews. The LIC event showed how extensive such reviews can become, producing the opinions of many stakeholders and about 500 recommendations. This is not to question the motivation of stakeholders or the quality of their input, but rather to set the stage for what we consider to be a sense of Company “fatigue” in expecting help to come from the outside.

Our work at CECONY created the impression that the Company is prone to accepting and implementing nearly all direction that comes from these many reviews, without critical analysis of its net effectiveness. The addition of yet another lengthy series of recommendations, this time by Liberty, runs a significant risk of failure if it is not clear that effective and lasting change requires that management be allowed to manage, regulators to regulate and other stakeholders to be heard.

A Simple Formula?

Managers manage

Regulators regulate

Stakeholder opinions are respectfully considered

The Commission has recognized the importance of giving CECONY flexibility in managing its business, and in responding to audits like this one. In its Case 06-M-1078 Order of January 18, 2008, the Commission stated:

Our decision to provide CECONY added flexibility is guided by previous experience with the management audit program and by the dynamics of how organizations can achieve successful and sustainable changes that yield performance improvements. Specifically, we previously concluded that “audit recommendations are best carried out in a spirit of cooperation among the company, the auditor, and staff ...”¹ In the past, the Commission recognized the need for flexibility in how the utility implemented the audit recommendations, and we wish to retain that flexibility. After receiving and reviewing management audit reports, we generally directed utilities to evaluate the recommendations, submit implementation plans, and work closely with staff. Clearly, there was an understanding of the need for flexibility and cooperation between Staff and the utility.”

Liberty’s experience, working with fully two-thirds of this country’s utility regulatory authorities, confirms the wisdom of this guidance. It is not clear, however, that it has worked out

¹ Cases 28053, 28054, 28055 and 27608, Opinion 82-16.

as intended over the months we have been working at CECONY. In the spirit intended by the cited Order, Liberty attempted a new approach that sought to produce a “spirit of cooperation.” We were not as successful as we had hoped to be in encouraging that atmosphere. We used a “strawman” approach to seeking consensus on major conclusions, and, more importantly, on crafting consensus solutions to addressing them. The approach had some success in producing agreement on solutions to needs that Liberty identified. Ultimately, however, the approach did not fully succeed in making CECONY a participant in problem identification. In other words, CECONY showed willingness to work with us on meeting needs that we identified, but did not show initiative in bringing its own list of needs “to the table.” Moreover, a “go along to get along” culture made it difficult to judge when the Company was truly buying into solutions to which it would remain committed after the audit was completed.

In fairness, the newness of the approach and the risk that can accompany candor in admitting weakness in a regulatory environment must be viewed as significant obstacles to the approach that we, Staff, and CECONY entered. Given those obstacles, it is likely that the approach produced as much forward movement as it could have, no matter what utility served as its first “guinea pig.” We therefore strongly recommend that the concept not be abandoned; on the contrary, a forceful implementation of the policy of promoting cooperative change is appropriate.

The regulatory system, in New York and elsewhere, is designed to encourage a high level of expertise within an investor-owned utility and to hold the management, and indirectly investors, accountable for performance that does not conform to expected standards. There is no greater key to success (for shareowners, customers, employees, and the public) than capable leadership and management. This group’s commitment to leading a sound business dedicated to public service must be complete and perseverant.

Performance inevitably tends to break down over the long term, however, if: (a) management is unable to provide those requisite skills, or (b) the regulatory system responds to problems and concerns (even if management-caused) in ways that overly constrain initiative and creativity in applying those skills. Liberty has concluded that the many forces at work in this regard form barriers to the effective working of the system. In general, we believe the many directives and recommendations offered to CECONY in the past tend to address the failings produced by those barriers but it is not as clear that they address the barriers themselves. In other words, the treatments go more to the symptoms than to the root causes.

Actually, our simple formula offered above is not easy to put into practice at CECONY, and a major reason for that difficulty is the barriers. In this chapter, we offer a discussion of the barriers and our thoughts on how they can best be addressed.

B. Findings

1. The Four Major Barriers

Our team of more than a dozen consultants has spent months studying CECONY; and a consistent view among them emerged. That picture is one of a company constrained by significant barriers, some of its own making, some caused by others and many that are simply a natural part of its environment.

We are especially impressed by the strength of these barriers and the way they interrelate to form a web that makes progress in many important areas very difficult. The fact that the Company is not particularly sensitive to some of the barriers, and accepts others as permanent, makes finding effective solutions problematic. We categorize the barriers into the four families discussed below.

a. Cultural Barriers

CECONY has a long-established culture that has many positive service-oriented elements. However, it is also an organization that has trouble seeing itself as others see it. In particular, the Company finds it very difficult to see different ways of doing things, and can be entrenched about its commitment to the wisdom of today's approaches. Coupled with a defensiveness borne in part of the external pressures of operating in an immensely bright spotlight, these traits work against making change.

One way of looking at a company's culture is to see it as the set of assumptions that prevails in an organization. Many of CECONY's assumptions are constructive and supportive of its public service obligations. A number, however, create barriers to change:

- Defensiveness
- Unrealistic self-assessment
- Inability to accept problems
- Unwillingness to consider alternate options
- A willingness to "go along to get along"
- A belief that critics "don't understand us."

b. Regulatory Barriers

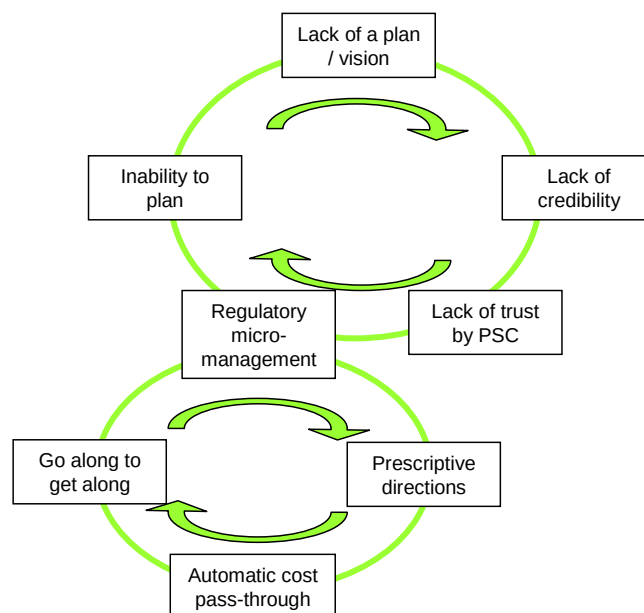
Liberty has worked for regulators in close to 40 jurisdictions; we believe that CECONY's regulator exerts as much or more detailed direction and control over the utility as any we have seen. It has been argued that the Company's performance and response demand such oversight; clearly that argument is sound. Nevertheless, over the long run, broad, detailed regulatory intervention cannot be expected to remain an effective substitute for management initiative and performance. Instead, it is more likely to produce a debilitating effect on management motivation and enterprise. Liberty has no criticism of the general level of regulatory intervention undertaken. Even if we did, we would view the problem as management's to solve through taking the kinds of consistent actions that build, rather than erode, public confidence. In short, when regulatory intervention becomes a routine and long-term solution it can eventually contribute to the problems.

Regulatory oversight that overlaps with the day-to-day management of the Company is a strong indicator that something is wrong, and correction must start in New York City, not in Albany. Company leadership needs to recognize that it must take the steps needed to regain confidence, lest it cede control to the regulator, in which case the system will not work in the long-term.

Our intention is to discuss this barrier in a "no fault" way. Searches for blame are not searches for change. As with all the barriers, there are logical reasons for its existence. A big reason here

has been the Company's inability to articulate a long-term vision for the system which has led to a lack of credibility and lack of trust. In turn, the degree of regulatory oversight, including frequent rate cases and line-item veto of proposed work, precludes effective long-term planning by the Company.

As illustrated in the accompanying diagram, a lack of credibility and trust lies at the heart of the need for regulatory intervention. Further, CECONY is willing to accommodate mandates in a framework in which all of the associated costs are passed along to customers. The culture of "go along to get along," as discussed earlier, makes this path of least resistance preferable.



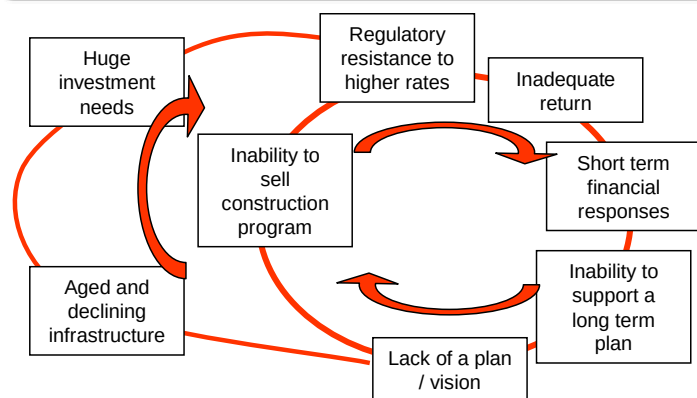
It surely appears that Staff is exerting due diligence, and that CECONY is ultra-cooperative, but who benefits from all of this? The voice of public safety is heard loud and clear in this dialog, but the balance between costs and CECONY's many other priorities, including public safety, may not be so clear. If all of the mandates CECONY is now pursuing are totaled up, does it remain clear that the resulting expenditures represent the best use of resources?

A review of the capital budget reveals another facet of this difficult issue. Liberty asked CECONY, via data request, to identify those elements of the capital budget that are "required by NYPSC mandate." The list amounts to 28 percent of the high-priority projects in electric operations and 83 percent of the gas projects². However, a closer examination reveals that "new business" represents more than half of the so-called electrical mandates. And the gas list includes "new business" as well as "load relief to meet future load growth." It is troubling to see these characterized as "mandates" and begs the question as to how many of the other projects listed as mandates are simply normal and essential parts of the electric and gas businesses.

A deeper question is the degree to which CECONY reasonably sees these as mandates. When the Company says that others are defining 100 percent of its gas investment, one must question the degree to which management feels it has ceded control. That should be considered unacceptable by both the Company and the Commission.

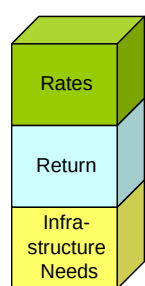
c. Financial Barriers

² CECONY claims that 83% of the gas budget is mandated by the PSC, 15% by New York City (required street interference work, etc.) and 2% mandated by others.

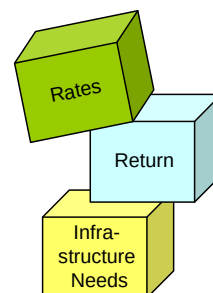


It is agreed that CECONY's aging infrastructure requires annual investments in the billions of dollars. At the same time, various maintenance programs also consume large amounts of money. The following report chapters demonstrate that the Company has not done a good job in explaining how such investments will satisfy the long-term needs of the system. The Commission has therefore been understandably

reluctant to approve the large rate increases sought. Lower rates of return and/or inadequate investment in plant are a likely result if this impasse continues.



It is in the financial barrier that we see the beginnings of a critical issue that may grow over time. It is here that we see the tangible results that current trends could eventually produce – a future inability to align infrastructure needs, rates, and return. To remain sustainable in an era of aging infrastructure, heightened service-level expectations, fundamentally different societal and business views of risk, and the resulting, vast expenditure requirements, CECONY simply must gain and



retain public and regulator confidence that it is providing an adequate level of service and protecting public health and safety at the lowest necessary cost. Absent the CECONY credibility it takes to produce that confidence, maintaining this balance as we look out into the future must be seen as insufficiently certain.

If the balance cannot be maintained, it is difficult to see (if we look well out into the future) how CECONY can retain the health to remain a viable option for effectively meeting public service needs at reasonable cost.

d. Environmental Barriers

The demands on CECONY by any measure are comparatively very high. Public pressure, customer expectations, regulatory control, and media attention make the Company exceptional when compared to the typical utility. The financial and human consequences of performance failures are also much greater. As CECONY leadership has acknowledged, being average is just not good enough. These pressures influence day-to-day decisions and add a dimension that greatly complicates the management of the business, while naturally contributing to the defensiveness mentioned above.

CECONY is held to a much higher standard, and few would disagree that a higher standard is indeed appropriate. That is simply part of the bargain; *i.e.*, the price that comes with serving one of the world's most critical electric systems and most demanding stakeholders.

e. The Combined Effect

As CECONY tries to deal with its day-to-day challenges and pursue its opportunities, we envision the barriers as constraints that effectively block any attack on the problems that it faces. Success in promoting change becomes a hit-or-miss proposition, as the barriers prevent many well-meant initiatives from taking hold, and in many cases prevent the organization from seeing challenges and opportunities in the first place.



An organization confronting many issues on a one-by-one basis, without awareness of the scope and power of the barriers, is in for a great deal of frustration. More importantly for our purposes, is the question of how CECONY effectively addresses the detailed recommendations of this report without an implementation plan that is sensitive to the barriers.

Addressing the barriers is the need that sits at the top of the pyramid. The effectiveness of our recommendations will be limited unless the Company's implementation plan fully recognizes the constraints.

2. Understanding the Constraints

Liberty has analyzed the barriers and, more importantly, their drivers. We found that the primary drivers tend to support more than one barrier, which in turn defines relationships among the barriers. For example, CECONY's lack of a long-term electric plan or vision is a driver of the financial barrier, because it is difficult to design a credible construction program without such a plan. It is also a driver of the regulatory barrier in that the lack of a plan leads to a lack of credibility and trust by the regulator, hence leading to an interventionist approach to securing compliance with public service responsibilities.

The analysis suggests that the following are the major drivers, or common denominators, of the barriers, and each one intersects at least two barriers:

- Lack of an electric plan or vision
- Lack of credibility with the regulator
- A defensive and often insular culture
- A high level of direction by the regulator
- The challenging local environment.

Each of these is a major factor in restraining CECONY from optimizing long-term success in its mission. Admittedly, there is some mixture of cause and effect in this list; nonetheless, the

combination of these factors establishes the barriers, and each factor works with the others to keep the barriers in place.

We have emphasized that many of the factors contributing to the barriers are natural outcomes that can be reasonably expected given CECONY's current circumstances. Hence it makes no sense to assign blame or point fingers. Instead, CECONY and the NYPSC should adopt a two-pronged strategy for dealing with the barriers. First, for those barriers that are likely to remain in place permanently, strategies for better coping with them and mitigating their negative impacts should be developed. Second, strategies should be developed for removing the other, less permanent barriers.

While this may sound simple, it is not. In fact, given the culture, environment, relationships, and general insensitivity to the barriers, effective solutions may not even be possible. There needs to be a fundamental change in thinking, the kind that usually follows a traumatic event. There have been such events in the last few years, and the response has invariably been the now-familiar script: recommendations, acquiescence by CECONY, and monitoring by the Staff. It should be clear that the traditional response will not put a dent in the barriers.

Liberty presents this picture not to suggest hopelessness, but rather to show what must be overcome if real change is to take place as a result of CECONY and PSC efforts. If solutions are to be effective, the highest levels of leadership must: (1) understand the nature and gravity of the barriers, (2) recognize leadership's current roles versus their desired roles and the gaps that exist between them, (3) commit to an aggressive plan and spend the time and effort to make it happen, and (4) be willing to take what might be significant risks in order to meet the other party half-way.

What is the risk if no action is taken? In the short-term, the answer is "probably little." The threats we see, and particularly the sustainability issue, are long-term. With time, however, it will get increasingly difficult and more expensive to reverse course, which will produce even more resistance to change and the possibility that the spiral can no longer be contained.

3. A Recommended Implementation Plan

We listed above what we think are four prerequisites for success:

- Understand the nature and gravity of the barriers
- Recognize the gaps between the respective parties' desired roles and their current roles
- Commit to an aggressive plan and spend the time and effort to make it happen
- Be willing to take what might be significant risks in order to meet half-way.

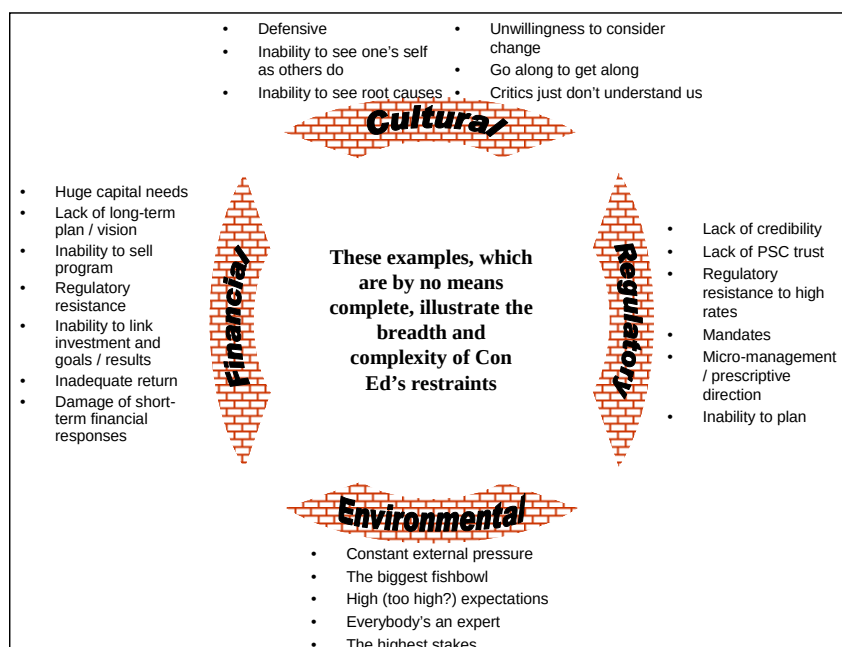
The first two prerequisites can be characterized as educational, and this is an essential first step. We do not believe that the Company has agreed with or fully understood our conclusions. We do not question the Company's honesty or desire to do better; but the culture is a powerful force preventing recognition of many of our concerns. Needless to say, solutions are simply not likely under those conditions. The first priority therefore needs to be a genuine effort on the part of the Company and the NYPSC to reach a "meeting of the minds." We suggest that this process has to take place at the top of both organizations. Executive engagement is the first step, and must continue throughout the process.

Leadership at both the Company and the Commission can provide the solution, but the burden here is especially on CECONY's management and directors. There are many reasons why this burden starts with the Company, not the least of which is that the Company has the most to lose.

Most recommendations presented to CECONY in recent years, including many in this report, are mechanical in nature, and lend themselves to the familiar script of acceptance by the Company and implementation under the monitoring of Staff. The suggestions associated with the barriers do not fall into this category in that they require a fundamental change in thinking, a shifting of strategy and a reborn set of relationships. Nothing less than executive commitment, involvement and leadership will work.

We therefore have not included the recommendations from this chapter in our list of recommendations, and we urge the Company and Commission to exclude them from the associated implementation and monitoring plan. Rather, Company and Commission leadership should establish their own implementation plan for the barrier issues and manage it at the executive levels.

The starting point has to be ventilation of the barriers – a dialog on what they are, how they affect the business and the priority of dealing with them. A starting point for such discussions can be the descriptions included in this chapter, the simplified accompanying diagram or a more complex analysis centered on the “circles” concept presented for two of the barriers above. Regardless of the starting point, the barrier analysis eventually must employ the circles. Since the barriers are interrelated, the forces from one must also be considered when dealing with another. This suggests that the more complex “circles” approach is essential. In addition, the circles offer a complete view of causes and effects, which are necessary for a thorough and actionable understanding.



Once the concept and details are understood internally, executives from the Company and Commission should come together and begin a process of jointly dealing with the issues. We believe that the PSC can stimulate this process and provide valuable leadership by taking the following initial steps:

- *Education*: Sell the concept of barriers, sustainability and the need for substantive changes in direction to the CECONY Board and executive management.
- *Definition*: Work with executive management to mutually define the barriers and how they hinder both parties' ability to fulfill their missions.
- *Support* (the carrot): Provide encouragement and incentives for the Company to change.
- *Pressure* (the stick): Use regulatory controls as appropriate to move the process along when necessary.

***Corporate Planning
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III. Corporate Planning

CECONY has an institutionalized annual planning process, and annual plans are developed as required at the business unit level. The Company does not distinguish between longer and shorter term plans, or identify a separate strategic planning process.

The guidelines for the planning process and the format and content of the annual plans are minimal, and the plans are not integrated. Thus, CECONY has 7 independent business plans for the operating units (Electric Operations, Gas Operations, and the 5 operating units in Central Operations) rather than one coherent, integrated plan. Further, a number of activities that should be considered part of an integrated planning process are performed in various parts of the business units, but not included in the annual plans. The annual business plans are more of a communications tool provided to executive management rather than a working process to manage the Company.

CECONY typically operates in a reactive mode. External events, particularly incidents and accidents, are the primary drivers of its activities. Within the operating organizations, there appears to be an awareness of the major risks facing them, but the Company is unwilling or unable to get out in front of them. An overarching conclusion of this audit was that CECONY needs to develop a long range vision for its electric business, in order to provide a basis for defining long-term network goals, and to identify major system needs and long-term programs required to meet the network goals. Developing and then planning in accord with this vision will drive the adoption of more disciplined and value-added approaches to system investment. The Company needs to move with dispatch in making this enhancement to assure continued progress toward a sound vision and goals at expenditure levels that are sustainable. CECONY has already begun working on meeting this need, by initiating a major effort to examine its practices, look at industry best practices, and make identified changes.

A. Background

1. Scope

This chapter of the report examines attributes of Consolidated Edison, Inc. (*CECONY* or *CEI*) and CECONY's management and organization structure and planning process at the corporate level including:

- The mission statement
- The statement of values
- Strategic objectives
- The Way We Work [a statement of corporate culture]
- The overall structure of the operating organization
- Planning processes

This chapter also examines attributes of the business unit or departmental organization structure and planning processes, including:

- Mission statements
- Statements of values
- Strategic objectives

- Planning processes

The criteria by which Liberty evaluated corporate planning included the following:

- Planning process/responsibilities/resources
 - There should be a longer term and a medium to short term component of the plan, or alternatively, there may be two separate, linked plans.
 - There should be an established schedule with milestones for development of the plan.
 - A specific individual or entity should have overall responsibility for development of the plan.
 - There should be designated individuals from each organizational unit responsible for that unit's input.
 - The planning process should be well-defined.
 - The products of the process (e.g., plan, goals and objectives, action steps) should be documented.
 - Performance versus the corporate and organizational plans should be regularly measured with corrective action, course corrections or plan revisions taken as appropriate.
 - The Company, starting with the Board, should have measures in place to assure compliance with all policies and procedures throughout the organization.
 - The Company should have a clear hierarchy of policies and procedures organized in a logical structure such that policies throughout the organization are linked.
- Plans, goals and objectives
 - The long term plan should be revisited regularly (annually or biennially) and a new plan should be prepared on a regular schedule.
 - A corporate plan should be in place with clearly stated objectives and goals that tie directly to the mission.
 - Resources, including capital, personnel and operating funds, should be allocated by the parent (CEI) in a manner proportional to the service needs of its regulated utilities. Resources, including capital, personnel and operating funds, should be allocated by CECONY in a manner proportional to the service needs of its electric, gas and steam operations.
 - The company should have long term as well as annual goals and objectives.
 - Goals and objectives should tie directly to the mission and vision statements.
 - The annual plans should have specific, measurable goals and objectives for the company as a whole and for the various organizational units.
 - Goals and objectives should balance the needs of all stakeholders, including customers, shareholders, employees and regulators.
 - Goals and objectives should include some long-term (decades) elements to assure the long-term viability and reliability of the system given the potential for an aging and increasingly fragile infrastructure.
 - Failed goals should not be abandoned in subsequent annual plans without thoughtful analysis, documented explanation and reasonable justification.
- Organizational plan
 - Organizational plans should be in place that flow logically from, and directly support, the corporate plan.
 - Each business unit should have an organizational plan which ties to the overall plan.

- The organizational plan should identify long and short term trends in needs of the company.
- The plan should identify trends in the demographics of the work force.
- Communicating the plan
 - The Company's mission, vision or other statements of purpose should be clearly articulated and universally understood throughout the organization.
 - All business units and organizational units should have the same understanding of the plan.
 - The plan articulated and conveyed through the organization should tie to general and specific goals and objectives.

2. Corporate Structure

CEI operates CECONY, O&R and non-utility businesses under an organization that reports to the CEO and Chairman of the Board. A President and COO manages CECONY operations, which divide into the following departments, all reporting to senior vice presidents, except for Environmental, Health, and Safety, which reports to a vice president.

- Electric Operations
- Central Operations (Engineering, Construction, Special Projects, Steam Operations, Substation Operations, and System and Transmission Operations)
- Gas Operations
- Customer Operations
- Environment, Health and Safety, reporting to a vice president.

A separate president and CEO manages Orange and Rockland's operations. A number of groups, also reporting to the CEI CEO and chairman, provide common services:

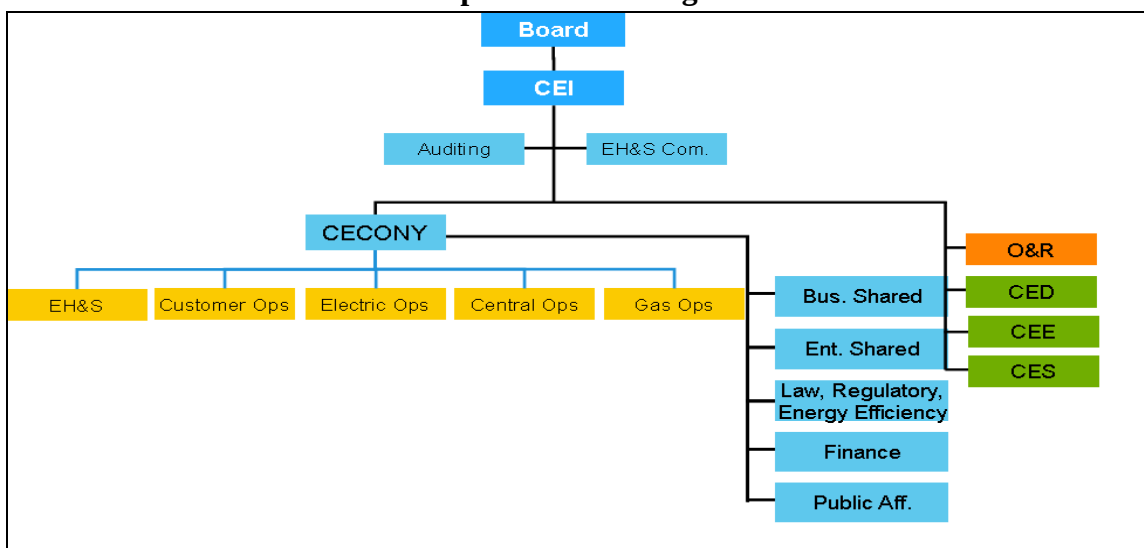
- Business Shared Services, under a Senior Vice President
- Enterprise Shared Services, under a Senior Vice President
- Law, Regulatory Affairs and Services, and Energy Efficiency, under the Executive Vice President
- Finance, under the Senior Vice President and CFO
- Public Affairs, under a Senior Vice President

CEI also operates three non-utility subsidiaries:

- Con Edison Energy, reporting to a president
- Con Edison Development, reporting to the same president as Con Edison Energy
- Con Edison Solutions, under a president.

The next figure depicts the corporate-level organization

CEI Corporate-Level Organization



This audit focuses primarily on the electric, central and gas operations, which include the following organizational units:

- Electric Operations, organized geographically for the most part, under 5 vice presidents
 - Bronx and Westchester
 - Brooklyn and Queens
 - Manhattan
 - Staten Island and Electric Services
 - Engineering and Planning
- Central Operations, organized functionally under 6 vice presidents
 - Central Engineering
 - Construction
 - Special Projects
 - Steam Operations
 - Substation Operations
 - System and Transmission Operations
- Gas Operations, organized functionally under two vice presidents
 - Gas Engineering
 - Gas Operations.

The remainder of this chapter uses the term “Business Units” to refer to seven functional units, which consist of Electric Operations, five of the units in Central Operations (Central Engineering, Construction, Steam Operations, Substation Operations, and System and Transmission Operations), and Gas Operations.

B. Findings

1. Mission Statement

The mission statement of CEI is:

Provide energy services to our customers safely, reliably, efficiently, and in an environmentally sound manner; to provide a workplace that allows employees to realize their full potential; to provide a fair return to our investors, and to improve the quality of life in the communities we serve.

The mission statement has remained substantially the same since at least the early 1990s. The one change has been to add the phrase *in an environmentally sound manner*, which was added around the year 2000.

CECONY considers its mission statement to be integrated with and supported by several other corporate statements and activities, which it depicts as a pyramid, in the fashion below.



2. Corporate Values

CECONY has a long standing set of stated Corporate Values, which are:

- Service
- Honesty
- Concern
- Courtesy
- Excellence
- Teamwork.

The Chairman in 1982 developed these values (except for the later-added “Honesty”). He referred to them as a creed, expressed in the following ways:

- **Service:** We will strive to provide the best possible electric, gas and steam service. We will never forget that what we do, and the way we do it, vitally affects the millions of New Yorkers who depend on our service.
- **Concern:** We will strive to show concern for the welfare of our customers, our fellow employees, and the men and women who invest their savings in our Company.

- **Courtesy:** We will strive to be courteous to our customers, to each other, and to all those whose lives we touch.
- **Excellence:** We will strive for excellence in all that we do. We will never be satisfied with less than the highest standards of performance.
- **Teamwork:** We will strive to work together in harmony as a team, combining our best thinking and efforts to make our Company the finest utility in the Nation.

The sixth value, Honesty, was added by the immediately preceding CEO and Chairman, and is expressed as follows: “**Honesty:** We will conduct our business with honesty and integrity.”

3. Core Principles

CECONY endorses six principles (developed around 2000), which it refers to as *The Way We Work*. These descriptions of company business processes and the desired work environment emerged from a cultural change initiative intended to address environmental compliance issues identified as a result of the Gramercy Park incident¹ in 1989 and the Arthur Kill incident² in 1998.

The principles are:

- Plan the Work and Work the Plan
- Seek and Accept Responsibility
- Communicate Openly
- Work in Teams
- Improve Continuously
- Celebrate Success.

¹ A steam pipe explosion in the Gramercy Park area of Manhattan, which, among other things, released asbestos into the air.

² A transformer fire at the Arthur Kill Generating Station on Staten Island that, among other things, released PCBs into surface water areas near the station.

CEI Core Principles



4. Strategic Objectives

CECONY maintains a set of Strategic Objectives. Those objectives had been in place for at least 10 years prior to revision in 2007. The table below compares the current Strategic Objectives with the prior ones, along with CECONY's characterization of the current objectives into two categories, *Strengthen the Core [Business]* and *Expand the Core [Business]*.

Objective	2007 Version	Prior Version
Strengthen the Core	Provide reliable service at reasonable costs.	Provide energy services to our customers safely, reliably and courteously.
		Keep customer costs as low as possible while providing an equitable return to our investors and maintaining a strong financial position.
		Encourage and assist our customers to use energy efficiently and economically through energy management programs that benefit both customers and the Company.
		Develop programs to enhance the economic development of our service area.
		Maintain the reliability of our generation, transmission and distribution systems and improve their integrity and efficiency.
		Improve the quality of our normal operating practices and our readiness to deal with

		emergencies.
	Be responsible stewards of the environment.	Take steps to mitigate the effects of Company operations on the environment and the public.
	Enhance external relationships.	
	Strengthen the Company's support activities.	
	Strengthen the Company's human resources.	Enhance the capability, effectiveness, motivation and professionalism of our work force, while providing opportunities for maximum development of individual potential.
		Enhance the safety and well-being of our employees.
Expand the Core	Build on successes at the competitive energy businesses.	
	Grow through regulated expansion.	

CECONY states that the Corporate Strategy provides the basis for corporate operation (business plans, budgets, operating decisions, and key performance indicators) and emphasizes support systems, new human resources challenges, and expands the scope of regulated investments.

5. The Corporate Policy Committee (CPC)

The CPC dates back to the late 1960s. Corporate Policy Statement CEI-030, last updated July 2007, defines the CPC's purpose, membership, functions and meeting logistics. The CPC includes the following officers of the Company:

- CEO (Committee Chair)
- CECONY COO
- O&R COO
- Senior Vice President and CFO
- Senior Vice Presidents
 - Business Shared Services
 - Central Operations
 - Customer Operations
 - Electric Operations
 - Enterprise Shared Services
 - Gas Operations
 - Public Affairs
- General Counsel
- Group President of the Competitive Energy businesses
- Vice President and General Auditor

The defined functions of the CPC consist of:

- Developing and executing the corporate strategy, and ensuring its alignment with the Corporate Values and mission statement
- Acting as a forum for the identification and discussion of issues that may affect corporate goals, objectives, and policies
- Deciding on plans of action to address current and long-range issues facing the Company
- Providing a vehicle for high-level communications on major issues and events that may have an impact on the company
- Providing an opportunity to keep top management abreast of significant developments in all areas of the company.

The CPC generally meets every other week. The CEO prepares the agenda, giving other members the opportunity to suggest agenda items and invited guests. The CPC also holds an annual off-site retreat, which usually focuses on one or several specific topics. The 2008 off-site meeting in March focused on leadership development and market trends and growth opportunities.

6. Planning Process

No specific corporate policy or procedure requires that the business units have individual mission or vision statements. All business units have at least one of the two, and some have both, as the following table summarized.

Business Unit	Mission Statement	Vision Statement
Electric Operations		✓
Central Engineering	✓	✓
Construction	✓	
Steam Operations	✓	
Substation Operations		✓
System & Transmission Operations	✓	✓
Gas Operations		✓

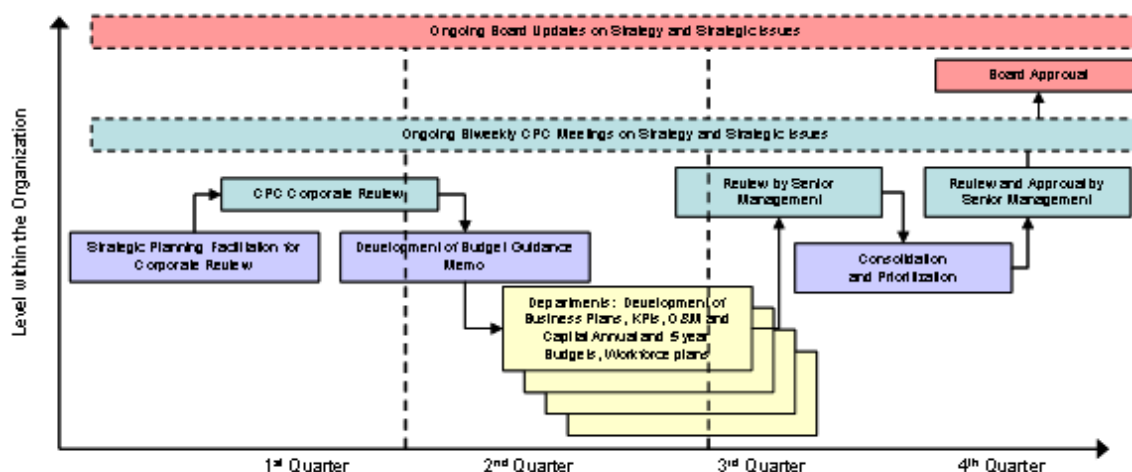
Exhibit I.A to this chapter provides the mission and vision statements of the business units.

CECONY's planning process, as the Company defines it, takes place at the business-unit level. Each Business Unit produces its own business plan annually, using a longstanding planning process based upon a corporate procedure for establishing annual goals. Corporate Instruction CI-020-1, *Developing and Monitoring Annual Goals*, provides guidelines for the development and publication of annual goals. That procedure, last updated in 1992, provides for CPC review of the mission statement, values and corporate goals, preparation of group, department and section goal review and approval up to the Chairman. The procedure also provides for ongoing monitoring of progress toward achieving the goals, without specifying the elements of that monitoring process.

There are many terms for types of planning and related planning horizons; *e.g.*, long-, medium- and short-term, strategic planning, business planning, and organizational planning, just to name a few. There exist no standard definitions of those terms. CECONY does not distinguish among

the various nomenclatures. It employs one general planning process and one set of plans, which it terms its annual business plans. CECONY depicts its planning process as the following diagram illustrates:

CECONY Strategic Planning Process



The Corporate Instruction focuses primarily on annual goals; however, in practice the process of setting those goals is an integral part of the Company's planning process. Each Business Unit develops a business plan, and those plans are then collected and included as part of the CECONY annual business plan. The Business Units generally follow the same process and time line for the development of their annual plans, which the following figure depicts:

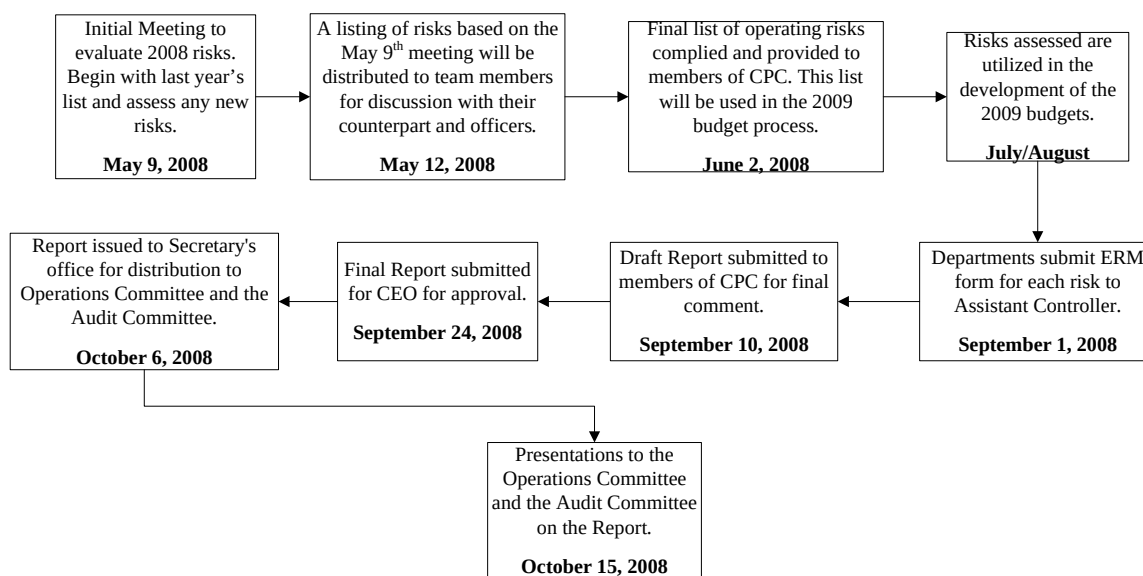
- *Regulatory Construct*: develop an initial assessment of possible future industry models and regulatory construct that could support such models. Potential future models should be able to deliver clean, affordable, reliable, and secure power to customers, meeting their needs as well as the needs of other stakeholders.

8. The Enterprise Risk Management (ERM) Program

CECONY began in 2005 a program and process that *...identifies, analyzes, integrates, assesses, manages, monitors, mitigates, and communicates the most significant operating and administrative risks across the enterprise. Operating risks result from the operation of the electric, gas and steam systems. All other risks are designated administrative.* As part of the development process, CECONY personnel visited National Grid, Southern Company and Constellation Energy. CECONY recognizes that ERM started off slowly and is still in the growth stage; management considers the current stage of its continuing evolution to be at least the equal of what any other utility is now applying.

CECONY has established an Administrative Team and an Operations Team, both with experienced employees (24 and 19 team members in 2008, respectively) to perform ERM activities. The process starts with an initial meeting to evaluate current year risks, which begins with the prior year's list, and culminates with presentations to the board's Operations and Audit Committees. The next figure illustrates the elements of the process and the timeline in 2008.

ERM Activities



The teams' members have the initial responsibility to identify potential risks for consideration by the full team. Risks are then rated on a three-factor scale for:

- Severity, including sub-factors of safety, financial exposure, and public perception
- Likelihood
- Controllability.

Each of the three factors and their sub-factors has a ranking scale; the individual scoring results of each are compiled to produce an overall Risk Priority Number. This number determines the

order of the risks in the final list. The 2008 rankings of risks included 29 administrative risks and 25 operations risks. The results, sensitive for security reasons, will not be reproduced here.

After the ranking of the risks and the completion of the review process, it is the responsibility of the Business Units to factor the results into their plans and budgets. CECONY performed a post-hoc analysis of its expenditures, concluding that 75 percent of its capital budget expenditures, excluding common expenditures, address the top 10 electric, gas and steam operations risks identified in the ERM process.

9. Business Unit Structure

CECONY's organization structure has evolved from a geographic organization to a hybrid organization. The chairman brought in from the outside by the board of directors in 1967, restructured the organization. His entry followed the 1965 blackout, a *Forbes* magazine article highly critical of the company, and an outside consultant's report critical of the company's public/media relations and the quality of its customer service. The Chairman found the company to have a highly-centralized structure, and determined that the way to address the problems was to create a divisional organization with local control. He created a divisional organization, which placed almost all aspects of the management and operations of CECONY in each the five boroughs and Westchester under the direct control of a regional vice president.

The organization continued substantially in that form until the late 1980s, when it began to evolve into a hybrid functional/geographic organization. Sometime before 1990, the business units, (electric, gas, customer service), were established under individual officers having design, construction and O&M responsibilities. Customer service was also established at that time as a separate business unit. Gas was centralized at the higher levels, with a geographic organization at the general manager level. Electric Operations remained regionalized under its 6 regional vice presidents.

The Commission's early 1990s Competitive Opportunities³ proceeding motivated CECONY to examine its structure in view of anticipated changes in the industry and in the Company operations. The Strategic Planning group examined a variety of industry and company structures. The Company then established the holding company, Consolidated Edison, Inc., on January 1, 1998. Some of the more significant steps in the evolution of the business units include:

Electric Operations

- 1997 – 98: Regionalized into Brooklyn-Queens, Bronx-Westchester, Manhattan and Staten Island
- 1999 – 2000: Created Engineering and Planning group under a vice president
- 2005: Facilities management transferred to Central Operations
- 2006 – 07: Centralized Electric Operations' QA function

³ Cases No. 94-E-0952 et al. – In the Matter of Competitive Opportunities Regarding Electric Service; Opinion No. 96-12 issued and effective May 20, 1996.

Central Operations

- 1998: Steam business unit transferred in
- 1999 – 2000: Divestiture of electric generation
- 1999 – 2005: Consolidation of Construction organization within Central Operations
- 2000: Added planning group to Substation Operations
- 2002 – 03: Consolidation of Engineering organization within Central Operations
- 2005: Consolidation of Project Management organization within Central Operations

Gas Operations

- 1997: All gas operations consolidated within Gas Business Unit
- 1997: Gas Environmental Health & Safety group created
- 2000: Gas Supply transferred to Shared Services
- 2000: Engineering combined under one chief engineer
- 2003: Engineering split into transmission and distribution
- 2003 – 04: Added Transmission Pipeline Integrity section
- 2004: Gas Control Center physically relocated
- 2006: Gas Control moved organizationally from Gas Supply in Shared Services back to Gas Operations to comply with FERC rules

Steam Operations

- 1998: Separated from Gas Business Unit
- 1999: Steam Business Unit established post-divestiture of electric generation – generation, distribution, billing, planning, and marketing all in same group. Billing transferred to Customer Operations shortly thereafter.
- 2002: Steam engineering transferred to Central Engineering; Planning transferred to Energy Management

Other Significant Organizational Changes

- 1996: Establishment of the corporate Environmental Health & Safety Organization, following appointment of the court-appointed monitor

C. Conclusions

1. CECONY has a clearly defined corporate mission statement but lacks a statement of vision. (Recommendation 1)

The Company states that there is no defined vision statement for CEI or CECONY, and that, “the mission statement and the pyramid that supports the mission statement are similar to a vision statement in terms of how the Company views its business success.” There is no one clear definition of what constitutes a mission statement, and the same holds true for a vision statement, core values, working principles and such organizational attributes. The attributes that Liberty sought in the formal expressions at issue here are:

- Mission: Why is the organization here? What is the organization’s reason for being, why does it exist, and what business is it in?
- Vision: Where is the organization going and when does it expect to get there?

Clearly, the presence or absence of a well-defined, written mission or vision statement in and of itself changes nothing; nevertheless, the presence or absence of a commonly understood sense of mission and visions with reasonable dimensions can have profound effects on its management

and operations. Using Liberty's two primary attributes for the mission and vision statements, CECONY has a reasonable statement of why it is here but not a statement as to where it is going with respect to the construction program focus of this audit. That concern is manifested by the absence of a clear vision for the future of the Company's networks, as expressed more fully elsewhere in this report.

2. Business Unit plans and their use are not sufficiently similar in format and content to promote integrated planning. (Recommendation 1)

The next table illustrates that four of the seven business units have mission statements, and five of the seven have vision statements. All business units have at least one of the two, and two business units have both.

Business Unit	Mission Statement	Vision Statement
Electric Operations		✓
Central Engineering	✓	✓
Construction	✓	
Steam Operations	✓	
Substation Operations		✓
System & Transmission Operations	✓	✓
Gas Operations		✓

The business-unit mission and vision statements (reproduced in Appendix I.A below) display pronounced differences. Four of the seven, Central Engineering, Construction, Steam Operations, and Substation and Transmission Operations have answered the question as to why they are here, while the remaining three, Electric Operations, Substation Operations, and Gas Operations have not. Only one business unit, Gas Operations, has clearly and specifically identified where it is going. Three units, Electric Operations, Substation Operations and System and Transmission Operations have very generally identified directions, and the remaining three, Central Engineering, Construction, and Steam Operations have not identified where they are going.

Those mission and vision statements that do exist do not follow a consistent set of formats, contain standard contents, or tie explicitly or implicitly to corresponding expressions at the corporate level. There are references to some of the attributes in the corporate mission statement, (e.g., safety, reliability, and efficiency), but they are inconsistent and incomplete. To paraphrase one of CECONY's core principles, one can't "Work the Plan if one doesn't Plan the Work."

3. There is not effective integration of business-unit plans at the top level. (Recommendation 1)

The COO accepts responsibility for the performance and coordination of planning that affects utility construction program, but has no staff assigned to the role; he undertakes this function personally. The Corporate Policy Committee does provides a vehicle for sharing information and discussing items of general interests to the senior management of the Company, but does not

address the integration of business-unit planning. It involves the senior officers responsible for construction program planning and budgeting, but does not address such issues in a focused, programmatic fashion.

The CPC generally met biweekly on Mondays for a scheduled time of approximately 2 hours. Liberty reviewed the agendas from all CPC meetings in the first half of 2008. The primary stated purposes of the various agenda items were for information sharing, briefings, and status reports. In addition to the regular attendees, the CPC frequently brought in presenters for briefings on specific items. Examples of topics discussed include PSC proceedings and actions, board of directors/trustees⁴ items, union contract negotiations, key FERC proceedings and actions, and an opportunity for all attendees to present items of interest. The CPC does not keep minutes or notes of meetings.

The development of annual business plans at the business-unit level, however, is institutionalized and staffed. Each of the seven business units has one or more designated individuals responsible for coordinating the development of that unit's annual plan. Plans are generally developed with substantial bottom-up input, contributed to and reviewed by the various levels of management, signed off on by the senior vice presidents, and reviewed in meetings with the COO and CEO.

At the business-unit level, the use, content and format of the business plans are very inconsistent. Corporate Instruction CI-020-1, Developing and Monitoring Annual Goals, which provides guidelines for the developments and publication of annual goals, appears to be the closest thing to a corporate procedure for the annual business plans. However, it is stale, dating from 1992, it includes an outdated mission statement and corporate goals, and it only mentions annual goals and objectives, and not the other elements of the plan.

Liberty examined the annual business plans for the seven Business Units for the years 2002 through 2008. The following table presents a comparison of the contents of the plans for the 7 business units for 2008.

⁴ See Chapter IV for a discussion of the common board structures of CEI and CECONY.

Business Plan Content and Format Summary

Electric Operations	Substation Operations	Central Engineering	System & Transmission	Construction	Steam Operations	Gas Operations
Vision	Vision	Mission	Mission	Mission	Mission	Vision
Roadmap for realizing vision	Issues	Goals and Performance Indicators	Vision	Business Plan 2008 – 2012	Goals	Long-Range Issues
Long-range issues	10 Individual Issues	Major Issues and Challenges	Five Year Plan		Objectives	Goals
Key Performance Indicators	App. 1: 2008 Rate Case Programs & Initiatives	Capital Program	Goals		2007 Accomplishments	Programs
Operating budget	App. 2: 2008 Major Projects Growth	Human Resources	Challenges and Risks		2008 Challenges	Operating Budget
Capital Budget	App. 3: 2008 Major Projects Reliability	Financials			O&M Budget	Capital Budget
	App. 4: Major Productivity Improvement Initiatives	Looking Forward			Major Initiatives for 2008	
	App. 5 & 6: KPIs 2007 & 2008					

The table shows that, across business units, and frequently within business units year-to-year, there is no standard format, table of contents, organization, or required content. CECONY has indicated that for the 2009 planning process, it will be using a standard template and format for all business units. That template was prepared but had not yet been approved at the time of the audit interviews.

4. The supporting documentation for the projects in the business plans is not referenced to the plans and is inconsistent in content and format. (Recommendation 1)

The plans differ widely across business units; however, most include a number of projects or activities to be initiated or continued in 2008. The business plans are supported by “budget books” and other documents describing those projects. Liberty attempted to examine the supporting documentations for representative projects in electric, gas and steam operations. However, the projects are not numbered or otherwise labeled and are not cross-referenced to the budget books. Further, some of the projects or activities were highly specific (e.g., “Work to achieve and maintain a one month working backlog of open secondary mains by year end 2009...”). Others were very general, with no specificity (e.g., “Deploy systems to make the organization more efficient and effective”). Thus, the plans do not tie directly to the underlying components that they contain. Liberty then requested that CECONY provide the supporting documentation for a sampling of projects and activities in the three business units reviewed. As with the business plans, the supporting documentation was dissimilar and inconsistent in the level of type and detail provided.

One major consequence of the approach to and contents of plans is that they serve more as once-per-year communications documents for top management than they serve as working documents that guide performance and provide a basis for results measurements. Inconsistencies across business units, inconsistencies year to year, lack of inclusion of critical activities under way or planned, and difficulty in accessing support materials make the plans, at best, cumbersome to use on an ongoing basis as the year unfolds. The best description of the plans was an observation by a manager who observed that "...the plan is a communications piece to align management with the direction the business unit is going."

Another important element of the planning process is the communication of the plans throughout the organization. There are no formal processes for communicating the business plans throughout the business units. CECONY's primary communications tool is the KPI process, discussed in Chapter VI, Performance Measures.

5. CECONY performs other activities that comprise elements of effective creation and use of plans, but does not integrate them fully into its planning process. (Recommendation 1)

CECONY performs a number of activities in the various operating organizations that Liberty considers to be important elements of CECONY's planning efforts, and may be implicitly included in the business plans, but which are not aggregated and integrated in the business plans or anywhere else. There is, in particular, an absence of longer term elements in the business plans. This disaggregated and unintegrated planning process and resultant plans are due, at least in part, to the absence of specific guidelines or requirements for the business plans and to the different approaches that the various operating organizations take to develop their plans. Some of the elements of planning identified by Liberty include:

- Key requirements of PSC Rate Cases and other Orders
- Other Governmental Directives or Agreements
- Operating and Capital Budgets
- Miscellaneous special studies and analyses (e.g., the Steam Resource Plan⁵)
- The ERM process and reports.

6. The Strategic Planning group has not had a clear, consistent purpose through the period following divestiture and restructuring. (Recommendation 3, 4)

Subsequent to the completion of those changes, the group has reported to several different officers, had an unclear charter, and lost 80 percent of its staff. More recently, CECONY has begun to re-emphasize the group. The company has brought in a new Vice President of Strategic Planning from outside the company, increased staffing to an authorized level of 14, and assigned it the responsibility for leading the work of the four interdisciplinary teams.

However, the mission of the group is still unclear, and the process and logic underlying the identification of the issues to be investigated by the four interdisciplinary teams is unclear. They apparently resulted from discussions by the Corporate Policy Committee, but it is not clear to

⁵ The Steam Resource Plan, a formalized 20-year look at production capacity and load forecasts, receives.

Liberty how and why they selected and framed those particular issues as they did. While they are undeniably important issues, it would appear that infrastructure replacement and incident avoidance would trump any of them. Further, it is unclear why the Company is betting on solar photovoltaics as opposed to a broader look at emerging and potentially competitive technologies on the one hand, while taking a much broader look at industry models in the Regulatory Construct team.

7. The ERM process is still in the rudimentary phase and is not incorporated into the planning and budgeting process. (Recommendation 2)

The Enterprise Risk Management process has potential for improving the management and budgeting processes, but is currently in the early stages and perhaps best characterized as a good start. ERM is performed outside of the operating organizations, does not drive projects and budgets, and evaluates most operating risks at a gross level that is not actionable. For example, a well-known risk is the risk of a gas explosion on the distribution system. The ERM exercise confirms what is already known and adds little extra information. What is needed is to take the exercise down several levels to determine which specific elements of the operation of the distribution system present the highest risk.

The determination that 75% of the capital budget is spent on high risk areas is largely a feel-good exercise, where existing projects were backfit to risks to demonstrate that they were addressed. For example, if third party damages and corrosion are the leading causes of gas incidents, one could spend the entire budget in just one of those two areas and say that 100% of the budget was spent in high risk areas. To a great extent, ERM at the level it is currently conducted tells senior management what it already knows. Perhaps the best characterization of the ERM process as it currently exists is captured in the comment from one senior manager to the effect that the ERM process is beneficial for the public, but has provided “no new learning” for the Company.

8. CECONY generally operates in a reactive mode. (Recommendation 5)

Unplanned responses to incidents and accidents regularly divert CECONY resources. CECONY frequently finds itself in a “firefighting” mode after serious incidents and accidents. When a problem is identified and addressed before an incident or accident, a planned response can be developed which identifies the most significant vulnerabilities and develops a phased, reasoned response. Once a significant event takes place and “goes viral,” to use an Internet term, external pressures often give CECONY no choice but to respond disproportionately, and funding for projects to address the proximate causes of the event becomes top priority. The natural consequence of such a response is that funds targeted for other activities are diverted to new priorities. Planned and perhaps equally or more important projects thus become subject to deferral.

A list of some of the more significant incidents and accidents is provided below, together with a very brief summary of the long term responses:

- Gramercy Park Steam Main Explosion and Asbestos Release (August 1989): Company indicted (1994), fined, placed on probation for 3 years; external environmental monitor appointed. Ten-year Steam Enhancement program, beginning in 1990, to replace failure-prone fittings on the system, asbestos in some manholes, etc. Company created EH&S

under VP position (1995); began to look at culture, which culminated in the development of statement of The Way We Work.

- Arthur Kill Generating Station Transformer Fire and PCB Spill (September 1998): Fines; return of environmental monitor who had been appointed as a result of Gramercy Park incident and who had completed his assignment earlier in 1998.
- Washington Heights Outage – cable and equipment failure (July 1999): 44 recommendations developed by PSC Staff report..
- World Trade Center Attack (September 2001): Established cyber-security center, established alternate energy control center.
- August 14, 2003 Blackout (August 2003): Much broader than CECONY – involves generators and ISO. Procedures, testing and training for black start of steam generation.
- Electrocution from Stray Voltage, East Village (January 2004): Developed and operationalized mobile stray voltage detector, 15 are continuously scanning streets; 5 year manhole inspection program with over 100,000 repairs.
- Burn from Manhole Cover, East Village (August 2004): Program to replace all of the approximately 5,000 manhole covers with composite hybrid or full composite covers.
- Long Island City Outage (July 2006): Distribution primary feeder failures; 87 recommendations in PSC Staff Report.⁶
- Steam Explosion Lexington Ave & 41st (July 2007): Steam incident action plan, including rain response procedure, trap inspections, substantially increase remote monitoring equipment locations, failure analysis procedure.

It is noteworthy that these incidents and events, with the exception of the World Trade Center attack and the 2003 blackout, were internal to CECONY. Additionally, other non-incident or accident events have also frequently driven activities that one might expect to be internally driven. For example:

- The PSC Competitive Opportunities proceeding in the 1990s was cited by a number of officers as a driver for review of the Company's organization structure, the establishment of a task force, and the ultimate restructuring of the Company.
- Steam rate cases in 2003 and 2004, and the ensuing settlements resulted in the Steam Production Cost Option Study and Steam Production Cost Study
- The ERM process was initiated at the suggestion of the board.

Incidents, accidents and other, non-catastrophic external drivers are part of the utility business. The question is whether the utility can anticipate, prevent, and respond to incidents and accidents. For example, the fact that CECONY had stray voltage problems and issues was well known within the company. Similarly, the fact that CECONY had hot manhole covers was well known by CECONY personnel. This is one of the functions of an ERM exercise – to identify and call attention to problems such as these before incidents happen.

⁶ Department of Public Service Staff Report on Its Investigation of the July 2006 Equipment Failures and Power Outages in Con Edison's Long Island City Network in Queens County New York, February 2007 in Case 06-E-0894

CECONY needs to move from a reactive to a proactive mindset as quickly as possible, which requires a massive cultural change. The difficulty of culture change should not be underestimated. An example, perhaps the only example in the last 20 years that could be characterized as a massive cultural change, was the environmental awareness movement.⁷ CECONY senior managers trace the beginnings of that movement to the steam main explosion in Gramercy Park in 1989. There is no question that CECONY devoted significant efforts, from top to bottom of the Company, to make those changes. Eleven years later, however, the March 30, 2001 report of the court appointed environmental monitor found that *...pockets of resistance persist, if not in the whole organizations then in parts of them.*⁸

9. CECONY lacks sufficient clarity in its long-term “vision” for the infrastructure necessary to move effectively, efficiently, and flexibly into an uncertain future.
(Recommendation 5)

A central issue that surfaced from many sources in this audit is the lack of an integrated vision or plan for CECONY’s electric business. The conclusion finds itself here because it generally fits with the subject (planning). Nevertheless, it derives from contributions by virtually all of the Liberty team members, including those responsible for the findings, conclusions, and recommendations in all the other report chapters. The statement of the conclusion here, as well as the recommendation that follows in this chapter, are intended to be reasonably self-standing. Nevertheless, it does take a reading of the entire report to place this particular subject in its fullest light.

CECONY has a variety of independent planning models within individual organizations; *e.g.*, electric distribution, substation operations and transmission operations. Nevertheless, no integrated vision or plan provides specific guidance for where the electric system is headed over the long-term. There is not a clear and specific design for the electric system to plan and work toward, and, equally important, to adjust from as future uncertainties unfold. A long-term vision would provide a much sounder basis than currently exists for identifying, assessing, modifying, and efficiently making infrastructure upgrades, system reinforcements and reconfigurations, and for establishing quantified long-term targets and metrics for gauging for system component characteristics and performance.

The company’s current focus is to “maintain its high standard of reliability in the future.” However, its plans and actions for achieving continued reliability have tended to be short-term and, to a disquieting extent, reactive in nature. Projects, programs and dollars expended tend to be focused on responses to emergencies and incidents, reactive safety and upgrade programs, and shorter-term load relief solutions. CECONY aims a number of separate short-to medium-term programs at sustaining the current level of reliability and at reducing risk. Consequently, there do exist many components of effective, long-term infrastructure growth, maintenance, and support, there is not a place where they come together to form a well-coordinated, comprehensive “plan

⁷ One might argue that the divestiture of generation was also a major cultural change. However, in that situation, the generators were sold off, thereby forcing a transition.

⁸ *Report to the United States Attorney and Con Edison*, Bernard, Mitchell S. March 30, 2001, Section IX, Item 4 (unnumbered page).

of attack” for meeting the immense economic, financial, operational, reliability, public and employee safety, environmental, and social challenges that make CECONY a company without U.S. peers in many key respects. One can readily identify specific responses to specific incidents, events, and stakeholder pressures. What does not emerge is a sense of how the Company fits them altogether, balances attention and commitment among them, and determines how they fit into a comprehensive structure of goals, objectives, initiatives, programs, activities, expenditures, and measurements, that will serve to meet short term needs in a manner that does not jeopardize the need to maintain long-term efficiency, effectiveness, and economy in an environment (taking that term in its broadest sense) that may take many different forms, many of which will cause actions consistent with one vision of the future to be ineffective or even counterproductive under an equally likely scenario.

An aging infrastructure complicates the Company’s challenges mightily. That issue has been a continuing concern for management and stakeholders at CECONY, as it has for many public and private operators of electric, water, transportation and other networks. Concern about the nation’s infrastructure, in fact, accompanies economic and financial revitalization as paramount national goals now and likely for some time into the future. In CECONY’s case, Liberty has found the Company unable to articulate clear relationships between investment and reliability or system age. The result is the lack of a defined vision for moving its infrastructure promptly, but efficiently and flexibly, through the coming two decades or so. There are no quantified long-term performance goals for the total system, and specifically for the key infrastructure components. Developing the vision that is required depends first on asking, thoroughly but promptly studying, and thoughtfully answering questions like:

- How does one measure the age of the system and its components, their performance levels at various ages and states of repair, and what it takes long-term to make aging components perform like newer ones?
- How does one correlate expenditures and reliability?
- Where are the currently planned infrastructure investments taking CECONY?
- What are key infrastructure needs for the next 5 years, the next 10, the next 20, and what long-term constraints will meeting short-term needs place on the costs of meeting long-term ones under a static view of the future, under alternate views?
- What are the economic and system benefit values of a dollar invested in one program when compared to another; at what point does repair and rebuild give way to replacement, given performance goals and recognizing technology, both as a source of new options, and as a potential “dinosaur” as public policies move in uncertain directions?
- How does one measure the true economic values of dollars spent on shorter-term and routine programs when they displace investments with longer term benefits?
- What level and types of expenditures now optimize the “glide path” to meeting desired infrastructure build-out in 5, 10, and 20 years?

Another key question to be answered in envisioning a master electric plan is the affordability of various annual investment levels. CECONY has increased its capital expenditure spending from about \$1.4 billion per year in 2005 to \$2.5 billion per year in 2008-2010. Greatly increased capital expenditure levels have driven the need for rate case filings in 2007 and 2008, and regular

increases look to be required in future years if that spending growth continues. However, there is no consensus on whether those increased levels are enough or too much. Some executives believe, for example, that the current \$2.5 billion annual capital expenditure level would merely “maintain” the average asset age at about the same level in the long run. Some at the Company question the propriety of focusing on age as a criterion; that merely begs another question to which there is no comforting answer: *“What is the differential in expenditures to maintain older versus newer infrastructure, and what outer constraints on component-life should be considered in valuing benefits to be gained from continuing maintenance expenditures?”* That question is much easier to ignore when one looks ahead five years than when one looks further into the future. It is that further look that Liberty suggests is a compelling one for a company in CECONY’s position. Otherwise, it becomes nearly impossible to measure objectively what customers will receive in the long-term from these huge investments.

Raising the spending level has had financial consequences. The 5 percent rate increase in the 2008 rate decision included a 9.1 percent return on equity and some capital expenditure disallowances. Wall Street has reacted by dropping the Company’s stock price to the lowest among peers, and in March 2009 was only trading at about the stock’s book value. CECONY’s credit rating has also been reduced. A \$2.5 billion (or greater) capital budget is probably not sustainable unless rates are increased by more than 5 percent per year.

Maintaining a capital spending program of \$2.5 billion per year would seem to require the Company to raise about \$1.5 billion in new debt capital and \$500 million or more in new equity per year. The company is near the lower limits of access to equity markets. CECONY has indicated that it will not sell equity at less than book value and its stock price is at or slightly below book value at this writing. With CECONY’s asset base growing at close to 10 percent per year, annual rate increases of substantially more than 5 percent would be required to ensure long-term access to market funding.

D. Recommendations

1. Improve the planning process. (Conclusions 1, 2, 3, 4, 5)

CECONY needs to make a number of improvements to its long and short-term planning processes, including:

- Developing a standard template for the plan for all business units to follow.
- Identifying what topics should be addressed by the plans. Topics should include, but not necessarily be limited to Business Unit mission and vision statements, annual goals, long-term goals with current status relative to achieving those goals, performance measures,⁹ and summary level capital and expense budgets.
- Providing guidelines for what supporting documentation should be provided with the plan.
- Requiring a standard format of indexing the supporting documents to the plan.
- Including specific longer-term terms goals and progress toward achieving those goals.

⁹ Performance measures are not necessarily KPIs, as explained in Chapter III of this report.

- Developing an abbreviated version of the plan to communicate throughout the CECONY organization.
- Updating the Corporate Instructions to include the above.

2. Take the ERM process associated with operating risks to the next level. (Conclusion 7)

As discussed above, CECONY needs to change from a reactive to a proactive organization. This is a multi-faceted problem with no single solution. However, a key element to making that transition is to anticipate and address problems before they turn into incidents and accidents that produce crash programs to address the consequences.

One tool in making that transition is a more sophisticated ERM process. Currently, the ERM tells CECONY what it already knows to a great extent, although this is the first time the key risks have been collected in one place, and assigned relative rankings. The next step is to drill down into each of the major risk elements and go through essentially the same process that was performed at the higher level. CECONY should identify, prioritize and address the vulnerabilities within each of the operating risks identified in the ERM process. If we consider the current process a Level 1 process, it may take a Level 2 or Level 3 process to get to the level of detail where the results can inform the planning and budgeting process.

Liberty recognizes that in some areas of operations, CECONY has done this type of analysis, although perhaps informally and perhaps under another name. This recommendation does not disregard those efforts, but would incorporate them into the process, and perhaps make them more rigorous.

3. Define the role of the Strategic Planning Unit. (Conclusion 6)

After the establishment of the holding company and the divestiture of generations, the Strategic Planning Unit lost its direction and purpose. With the recent appointment of a new vice president, CECONY should now identify the mission of the group. Staffing of the interdisciplinary teams is a temporary assignment, not a mission.

The Strategic Planning unit could play a key role in examining and changing CECONY's reactive corporate culture. One activity could be the performance of case studies of the conditions that preceded several of the incidents and events noted earlier. For example, stray voltage issues and hot manhole covers were well known within CECONY, yet it took a death and an injury, respectively, to force a programmatic addressing of the problems. Case studies could identify how and why those problems were not addressed.

4. Revisit the subjects investigated by the interdisciplinary teams. (Conclusion 6)

The teams represent a substantial investment of time and effort. The Company should revisit whether their individual missions are overly narrow (*e.g.*, solar photovoltaics as opposed to a wider range of promising technologies), or overly broad (*e.g.*, develop a long range vision of industry structure and the role of the regulated utility).

5. Develop a comprehensive vision and 20-year master plan for the electric system.
(Conclusion 8, 9)

This recommendation has been the source of significant discussion between Liberty and senior CECONY executive management. There are many areas of agreement. The following discussion includes significant input from the Company, but in total should be taken as an expression of a solution that Liberty is comfortable would address the conclusion to which it relates.

CECONY should develop and promote a comprehensive master plan for the electric system. A long-term electric master plan will first enable the company and its board to define its long-term network vision and goals. It will then require the identification of major system needs and long-term programs required to meet the network goals in a range of potential future environments. The plan, and equally importantly the thought methods it will generate, will drive the adoption of more disciplined and value-added approaches to system investment. Such an enhancement is necessary to assure continued progress toward a sound vision and goals at expenditure levels that are sustainable.

The board will develop more tangible and comprehensive ways to grasp the significance of company's initiatives, projects and programs and to understand the linkage of the five-year capital plan and the annual budget to longer-term objectives. Their oversight of construction program planning will move from a moderately lagging to a leading position. A master plan would support a more robust approach to electric system planning and demonstrate the connection between transmission, substation and distribution planning for both the short-term and the long-term. It would also better link annual and multi-year projects and programs to meeting the long-term network goals. Another key benefit will be the building of stakeholder trust and confidence in the processes and activities that will continue to underlie what seem very likely to be significant capital and O&M program expenditures.

The development of the plan should begin with a "clean sheet of paper" so as not to be unduly influenced by existing programs, plans and capital budgets. Elements of developing a master plan should include:

- A clearly defined system vision and design for 20 years or more
- Quantified goals and objectives for reliability, system component ages and load capabilities
- Priorities for major components of system build-out
- Milestones for progress on major system initiatives
- Defined strategic projects that will have longer-term system benefits
- Assessment of long-term rate impacts and affordability levels (funding plans)
- Consideration of long-term value added for strategic projects and system components
- Strong linkage between the master plan and long-term projects and programs
- Defined criteria for corporate priorities and customer needs
- Incorporation of appropriate investment decision support tools and techniques that will demonstrate system value effects for management and board
- Prioritization of prospective capital allocation based on defined economic and strategic system criteria
- Require quantified performance metrics for plan execution

- Incorporation of an enhanced Enterprise Risk Management (ERM) program, which begins from a sound platform, but requires evolution to fill the role envisioned here
- Incorporation of demand-side management growth
- Creation of feedback loops that evaluate past decision-making and their impact on meeting plan goals
- Enhancement of involvement and oversight from a board that demonstrates strong capabilities and in many respects inclination to take the forward-looking role that CECONY's particular circumstances justify

It is anticipated that the long-term plan will be monitored and updated as required. The master plan should be reviewed with the board annually and updated every three years to capture revisions in energy policy, technology changes, customer growth and evolving consumer behavior. The plan should also meet the requirements of each of the transmission, distribution, energy supply, customer operations and demand side management programs.

Since customers' needs are constantly growing, the company needs to plan for the growth in demand as well as replacing and upgrading its infrastructure. Demand side management (DSM) is a critical component of the master plan considered in developing the strategic system requirements.

Using a team of creative and innovative people, the Company should develop a forward-looking methodology to analyze and place economic valuations on its strategic initiatives and projects, so that capital investments may be prioritized based on benefits and value relative to other programs. Optimizing investments would improve the ability of the Company to meet long-term goals. A prioritization process for allocating limited funds to projects and programs is faced with a variety of different considerations. The inputs to the process could be multi-dimensional – across all electric business operations, with differing time horizons, and including costs, benefits, and more qualitative benefits such as safety. Multi-year long-term projects or programs would have to be evaluated against a one-year program on an equivalent basis.

Some projects/programs do have costs and benefits that are more easily quantifiable. However, Liberty emphasizes that different types of investments can be compared on an equivalent basis by using consistent, multi-year economic analysis techniques that are commonly used at practically all major corporations. Such analysis techniques have been widely applied in the utility business since at least the 1970s; however, CECONY has been resistant to acknowledging their application value. Chapter 5; *Budgeting* provides conclusions and recommendations that CECONY develop these tools and techniques for capital budgeting purposes. They are also applicable in determining the most beneficial alternatives for meeting the investment requirements of the electric master plan. Business cases utilizing economic analysis techniques take both quantitative and qualitative benefits into consideration, and should be adopted.

The areas on which CECONY should focus in moving its approach toward industry best practice include economic valuation, resource allocation and risk mitigation, and should also incorporate the company's Enterprise Risk Management program to ensure the latter initiative's consistency with the changes to be made. This approach will move the Enterprise Risk Management in the direction that CECONY is already seeking, which is to make it an industry best practice. The

Company has shared some of its plans for making improvements in these areas. It is clear that a major effort to move in the direction called for by this recommendation is underway.

The long-term (*i.e.*, 20 or 25-year) master plan must be linked to and progress toward it monitored by shorter-term plans. The company currently has an annual budgeting process and a 5-year capital plan and financial forecast. In addition, several 10-year system planning models are utilized in electric operations, substation operations and transmission operations. All capital plans, financial plans and system engineering plans must consistently be linked to and support meeting the goals of the master electric plan. Projects, programs and expenditures that are in one-year budgets must support and be consistent with the 5-year capital plan and financial forecast. In turn, the five-year plans must be consistent with and support 10-year plans, which support the master plan. Planning across all time horizons must be consistent with, support, and provide steady progress toward meeting the goals of the master plan. Attention to this linkage over various time horizons is crucial to systematically achieving the master plan vision.

The master plan is intended to provide a vision and goals for the capital investment process and tie together the annual budget, projects, and programs so that they will closely address both short-term and long-term goals for the Company. Sound capital investment will favorably affect the Company's goal to sustain high levels of reliability of service over the long term.

Shorter-term programs may be closely linked to long-term programs and long-term reliability, as they provide the means to maintain the infrastructure in good condition so as to not to require a massive amount of replacement at some point in the future. They also must be consistent with meeting the goals of the master plan. These areas include:

- *Transmission and Sub-transmission System:* To maintain system reliability over time, a systematic replacement of major substation components may be adopted. Major components include replacement programs and inspection programs. These programs minimize the risk of a prolonged loss of an area and transmission substation, both of which would result in significant outage events resulting in negative public reaction, public safety concerns, security issues, and loss of revenue.
- *Distribution System:* The Company's Electric Operations department has three categories of programs in place that maintain distribution system reliability and modernize system components. The categories and supporting programs include load relief and reinforcement programs, reliability programs, and maintenance programs. These programs minimize the Company's risk of a network shutdown or extended outage for a significant number of customers, due to a storm related event or underground equipment failure.
- *Transmission Conductors:* The criteria for repair or replace transmission conductors is based extensively upon engineering assessment and considers several factors including age, types of problem, past performance, ability to maintain, environmental conditions, spare part availability, loading, fault duty level, and system operating conditions.
- *Major Structural Components:* The Company provides an ongoing assessment of the major structural components of area and transmission substations. The program addresses both routine and regulatory mandated inspections and provides the basis for many of the structural projects initiated by Engineering for electrical facilities.

The electric master plan will consider the steps that could be taken in the short and medium-range needs to meet the Company's future energy needs in a sustainable manner, and at the same time, balance strategic goals such as state and local energy initiatives. The Company must analyze these program investments to determine their economic value relative to other short-term as well as longer-term expenditures.

The Company has the obligation to serve its customers safely and reliably. Reliability programs have the added direct or indirect benefit of providing enhanced safety. The company lists specific safety objectives in its ERM. Programs listed in its ERM program will be an integral part of the master plan. The Company's inspection and maintenance programs are important components of its reliability and ERM processes. Again, the company must analyze its safety and reliability programs to determine the "bang for the buck" relative to all other investments. While the company may consider the analysis and valuation of routine expenditures and safety programs to be difficult, such information should be provided to, if not demanded by, decision makers and the board in considering the approvals for limited capital dollars.

The preparation of a comprehensive master plan will act as a roadmap for planning and investment. An economic valuation and prioritization methodology will be developed as a tool to guide the selection of projects and programs, to allocate investment levels at the corporate level, and to provide value-based input for the determination of the optimal total spending level. Managers will be able to objectively select from a portfolio of investments that will most economically advance the company's strategic goals and drive toward master plan goals.

Such a consistent approach may require common templates, tools, and guidelines across all electric business units to ensure proposed projects are evaluated fairly and that costs, benefits and risks are well understood. A level playing field will be created to select the most appropriate portfolio for investment, to align spending using objective metrics, and to generate internal and external transparency in the process. Analyses should consider qualitative and quantitative benefits, as well as compliance with requirements of city, state, federal agencies and other relevant organizations,

The Company should also develop a prioritization and investment governance structure that will define the process for analyzing, selecting and approving an investment portfolio. This will help prioritize the projects/programs that become part of the annual budget. Management must achieve multiple targets and balance long and short-term objectives simultaneously to further their one-year, five-year or ten-year plans. A master plan will facilitate this process by providing the long-term objectives. Developing and applying a standard analysis technique for the selection of a portfolio and allocation of capital provides a tool to this challenge.

The Company should also develop a link between the areas of planning, budgeting and performance measurement to evaluate the Company's progress toward achieving long-term goals and objectives. Feedback loops that consider how short-term decision making (and annual budgets) will potentially impact long-term goals will be necessary in this evaluation. In order to forge a strong link between how actual projects and programs perform and how they align with long-range strategies, continuous monitoring and feedback loops must be integrated into the

planning and investment process. Projects that do not tie in with the strategies of the Master Plan due to lack of progress or a changing environment should be identified and eliminated.

Exhibit III.A: Business Unit Mission and Vision Statements

1. Electric Operations

Mission Statement:

None.

Vision Statement:

- Maintain our status as the most reliable utility in the country
- Become top decile in Safety performance as measured by POSHA incidence rate
- Minimize the possibility of injury as a result of system failure support strategy by attracting, developing and retaining a high performance team in Electric Operations
- Optimize methods to meet system demand through a mix of supply and demand measures
- Create a culture where all employees understand that we have to satisfy our customers
- Increase our efficiency using innovative technologies and work process improvements in order to mitigate cost escalation.

2. Central Engineering

Mission Statement:

The Mission of Central Engineering is to be a leader in advanced technology and provide to our customers the technical and engineering expertise necessary to manage risk and ensure sustained safe system-wide operation and maintenance in both cost effective manner and within design criteria.

Vision Statement:

Central Engineering fully realizes the complexity of today's utility industry and the significance of providing reliable services to the greatest, and perhaps the most demanding, city in the world. This is a responsibility that includes safeguarding our service communities, designing systems to accommodate future demand growth and preparing our system to meet that demand. Whether it is re-powering our generating stations, or building new substations such as Parkview, Newtown, Rockview and York, we are working with our customers to meet our commitments while demonstrating leadership and excellence.

3. Construction

Mission Statement:

Provide efficient, cost effective, and multi-skilled construction services to the Company in a safe, environmentally excellent manner.

Vision Statement:

None.

4. Steam Operations

Mission Statement:

The mission of Steam Operations is to:

- Provide safe, reliable, and economical energy to our customers
- Demonstrate respect for the environment and the communities we serve
- Create an atmosphere that fosters safety and the development of our employees
- Provide values to our shareholders.

Vision Statement:

None.

5. Substation Operations

Mission Statement:

None.

Vision Statement:

Substation Operations plays a central role in the Company's operation, maintenance and construction of the transmission and distribution system. Substation Operations is committed to providing a safe, reliable, environmentally sound and secure workplace. SSO continues to support the Company's Stakeholder Programs of Public & Employee Safety, Emergency Response, Regulatory/Environmental Excellence, Increased Customer Demand, Reliability, Strategic IT enhancement, Employee Development and Efficiency/Process Improvements. We will continue to provide a high level of reliability for our customers through well cared for and constructed facilities, knowledgeable supervision, along with highly trained and motivated operators, mechanics, and technicians. Our substations will be maintained at a high level of preparedness and security, with a balanced approach to productivity enhancements and cost control, while maintaining our committed focus on safety and environmental excellence.

6. System and Transmission Operations

Mission Statement:

The mission of S&TO is to operate the electric and steam systems in a safe, secure, efficient and reliable manner; to assure the reliability of the transmission system through effective plans, design, analysis, emergency preparedness and system recoverability; and by preventing, detecting and correcting problems in a timely and productive manner.

Vision Statement:

S&TO does not have a vision statement per se, but has a two and one-half page narrative, not reproduced here, entitled *Vision of the Future* which describes, in a very general fashion, operating characteristics of the electric system of the future, at some undefined date.

7. Gas Operations

Mission Statement:

None.

Vision Statement:

Gas Operations has a vision for the year 2025, broken down into Workforce, Transmission System, and Distribution System sections. The three sections contain 14, 15, and 17 specific statements, respectively, describing what specific aspects of their operations will look like in 2025.

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IV. Corporate Oversight

CEI has a board of directors; CECONY has a board of trustees. The CEI and CECONY boards have common membership and they operate in common, although their decisions and approvals are kept sufficiently separate to meet the distinct obligations that the members, while common, have to the two separate legal entities. References to “the board” generally mean both, unless specified otherwise in this report. Liberty found the board members to be well-qualified and actively engaged when compared with other boards we have examined. The board makes representative use those committees that typically are the most involved in matters involving the construction program. The Operations Oversight and Environmental Health & Safety committees devote significant time to matters involving the operation of the service delivery assets and networks that result from construction activities.

The Operations Oversight committee in its short history has focused on responses to highly visible incidents. It should and has begun to seek out a role that will place it more “ahead of events.” The board should also develop a more frequently exercised role in long-term plan creation and performance review. Providing more detailed, routine quantitative reports (a “dashboard” of key cost, schedule, and operating information) is also warranted. The board also needs to look at the interaction and overlap of roles among committees and rationalize them. These improvements will help to strengthen the oversight that the board provides to CECONY construction program planning an execution. Finally, the board finds itself at a critical juncture as retirement requirements serve to remove the members most experienced in utility operations. The board has acted to address that issue in part; it needs to remain “on the lookout” for replacing key skills, even as it addresses broader needs to promote personal excellence, breadth of talent, diversity, and other factors that contribute to an effective oversight body.

These improvement opportunities recognize that judging CECONY requires consideration of the factors that make its construction and O&M programs and expenditures unique:

- Current and expected expenditures are very high
- Territorial denseness and customer size and mix base make work performance complex
- Two other utility businesses (gas and steam), large in their own right, operate with an electricity business whose magnitude can cast a long shadow on how the other two are performing
- Stakeholders do not exhibit enough confidence in management’s ability to provide credible estimates of construction and operations needs and expenditures.

Such factors require that CECONY’s needs at most senior level be examined against its own circumstances, not those of some composite, “average,” or typical utility. Clearing the hurdles that others have simply won’t be enough to make CECONY successful in the long run; if its hurdles are higher, it must bring greater skills to the arena in which it performs.

The roles and activities of the board, Internal Auditing, and the independent accountants collectively produce an effective overall approach to addressing the controls-related requirements of Sarbanes Oxley. Liberty’s scope excluded an examination of fraud prevention or detection programs and activities. We did assess controls related to assuring efficiency and effectiveness in construction program planning an execution. Key controls cover such issues in a

manner that is commensurate with what we have observed elsewhere. We found the operations auditing program and resources to be a strength; however, we believe that CECONY has the staff ability and accordingly the opportunity (given the magnitude and complexity of its construction program) to undertake examinations of effectiveness and efficiency, in addition to procedural-compliance examinations that have characterized much of their work to date.

A. Background

1. Scope of this Chapter

This chapter addresses the oversight provided by the CEI board of directors and the CECONY board of trustees to construction program planning and execution. It focuses on the roles that the boards take with respect to planning, budgeting, performance measurement, linking incentive compensation to performance and overall controls. The controls review does not address matters of intentional misconduct, such as those raised by the recent indictments of CECONY employees. Those matters require a detailed, focused review not typically performed in management and operations audits. Liberty's review of controls examined the degree to which overall programs (*e.g.*, addressing overall compliance with Sarbanes-Oxley requirements and operational auditing) addressed important construction program planning and execution efficiency and effectiveness. Audit work examined the controls identified and it determined whether the company subjected the testing of those controls to regular testing. It did not examine the quality of the testing or its sufficiency to address controls failures that resulted from personal dishonesty, as opposed to good faith, but ineffective attention to the promotion of work efficiency and effectiveness.

The criteria by which Liberty evaluated corporate oversight included the following:

- There should exist a board structure, clear duties and responsibilities and strong membership that provide for effective board oversight of construction program planning and execution.
- The quality of information provided to the Board by management should be suitable for critical and objective decision-making.
- There should exist a strong, top-level commitment to creating a proper controls environment for construction program planning and execution.
- The Board should routinely examine the effectiveness of construction program planning and execution against objective criteria.
- There should be routine, comprehensive measures for assuring compliance with SOX requirements.
- Key controls should reflect an adequate focus on construction program planning and execution.
- The Board should routinely examine the effectiveness of controls applicable to construction program planning and execution against objective criteria.
- The Board should demonstrate a suitable interest in key service-related areas such as rates, customer service and reliability.
- Internal Audit Planning should proceed from a comprehensive, structured assessment of risk that includes due consideration for meeting public service responsibilities.
- Internal Audit resources should be sufficient to support a properly developed annual audit plan and a reasonable level of unplanned activities.

- Internal Audit should routinely and comprehensively examine performance related to construction program planning and execution.
- There should be a structured, diligently applied process for follow-up to audit recommendations.
- There should be focused responsibility for assuring that corporate-level procedures support the roles that all work groups play in construction program planning and execution.

2. Board Structure

The parent, CEI, has a board of directors, as does CECONY (although its members are termed “trustees”). The utility board has a technically distinct identity, but its members and committees are identical, and the two boards and their committees meet at the same times. The minutes prepared by each reflect the distinct issues and approvals that each board addresses and makes for the parent and for the utility. The board structure includes the following committees:

- Audit: meets with company management, the General Auditor, and the independent accountants to address internal controls, accounting matters, financial statements, and the scope and results of internal and external audit programs; this committee appoints the independent accountants, subject to shareholder ratification.
- Corporate Governance and Nominating recommends candidates to fill board vacancies, considers board composition and size matters, makes recommendations for board member compensation, and addresses other corporate governance matters (e.g., board independence criteria and corporate governance guidelines).
- Environment, Health and Safety: advises management on environment, health and safety policies and matters, reviews environment, health and safety programs and compliance with environment, health and safety laws and regulations, and makes recommendations to promote sound environment, health and safety planning.
- Executive: may exercise all board powers (with specific exclusions) between board meetings.
- Finance: reviews and makes recommendations about financial condition and policies, dividend policy, bank credit arrangements, financings, investments, capital and operating budgets, major contracts, real estate transactions, litigation, and other financial matters, and reviews financial forecasts.
- Management Development and Compensation: makes recommendations to the Board officer and senior management appointments and compensation, makes incentive compensation awards to officers (subject to board confirmation), administers the stock option plan, makes recommendations for executive succession and transition and minority and female recruitment and promotion, makes ERISA recommendations to the Board, makes recommendations regarding benefit plans, trustee selection, funding policy, contributions to the funded plans, and reviews funded plan performance.
- Operations Oversight: oversees the electric, gas and steam systems’ operations.
- Planning: reviews and makes recommendations to the Board regarding long-range planning.

3. Board Composition

The CEI directors and the CECONY trustees at May 15, 2009 are:

- Kevin Burke: Chairman, President and CEO, Consolidated Edison
- George Campbell, Jr.: President, The Cooper Union for the Advancement of Science and Art, New York, New York
- Vincent A. Calarco: Non-Executive Chairman of Newmont Mining Corporation, Denver, Colorado, and former Chairman, President and CEO of Crompton Corporation (now Chemtura Corporation)
- Gordon J. Davis: Partner, Dewey & LeBoeuf LLP, New York, New York
- Michael J. Del Giudice: Senior Managing Director, Millennium Credit Markets LLC, New York, New York
- Ellen V. Futter: President, American Museum of Natural History, New York, New York
- Sally Hernandez: Attorney, Yonkers, New York
- John F. Killian: Executive Vice President and CFO, Verizon Communications Inc., New York, New York
- Peter W. Likins: President Emeritus, University of Arizona, Tucson, Arizona
- Eugene R. McGrath: Retired Chairman, President and CEO, Consolidated Edison
- Michael W. Ranger: Senior Managing Director, Diamond Castle Holdings LLC, New York, New York
- L. Frederick Sutherland: Executive Vice President and Chief Financial Officer, ARAMARK Corporation, Philadelphia, Pennsylvania

The Board acted on November 20, 2008 to increase its authorized size to 13 and to elect John F. Hennessy III, a principal in the firm of Hennessy & Williamson and the former Chairman of the Board and Chief Executive Officer of the Syska Hennessy Group. These actions respond to the impending departure (occasioned by age limitations on board membership) of Mr. Likins, whose term ends at the time of the next annual meeting. The following table shows the boards' committee assignments at May 15, 2009.

CEI and CECONY Committee Assignments

Member	Audit	CG&N	EHS	Exec.	Fin.	MD&C	Ops.	Plng.
Kevin Burke				Chair				
Vincent A. Calarco	Chair	√		√		√		√
George Campbell, Jr.		√				Chair	√	
Gordon J. Davis			√		√			√
Michael J. Del Giudice	√	Chair		√		√		√
Ellen V. Futter			Chair				√	√
John F. Hennessy III							√	
Sally Hernandez		√	√		√	√		Chair
John F. Killian	√						√	
Peter W. Likins		√	√	√	√		Chair	√
Eugene R. McGrath				√			√	√
Michael W. Ranger					√			√

L. Frederick Sutherland	√				Chair			

B. Findings

1. Construction Program Role of the Operations Oversight Committee

The parent and utility boards include an Operations Oversight Committee, which oversees electric, gas, and steam operations. Membership and committee responsibilities have remained the same since the committee's formation and first meeting on May 21, 2007. It changed in November 2008 to reflect the addition of a new member, added to address the impending departure from the board of The University of Arizona's President Emeritus (a trustee of CECONY for 20 years and a CEI director for more than ten). This long-time member has chaired the committee. The other members serving on this committee at May 15, 2009 are:

- The New York-based President of The Cooper Union for the Advancement of Science and Art (a CECONY trustee and a CEI director for eight years)
- The New York-based President of the American Museum of Natural History (a trustee of CECONY for almost 20 years and director of CEI for almost 10)
- The immediate past, retired Chairman, President and CEO of Con Edison
- The principal in the firm of Hennessy & Williamson and former Chairman of the Board and Chief Executive Officer of the Syska Hennessy Group.

The charter of the committee requires a minimum of three members, none of whom may be corporate officers. The committee must meet a minimum of four times each year; the chair has the power to call additional meetings. The charter assigns the following duties to the committee:

- Provide oversight to management on: (a) operating systems' design, operation, maintenance and performance, and (b) matters management brings to the committee's attention
- Review significant issues and events relating to reliable systems operation
- Make reviews and recommendations as the Committee deems appropriate for enhancing operating systems' design, operation, maintenance and performance of the Company's operating systems
- Perform such other functions as the Committee deems appropriate in accomplishing its purposes.

Through June 2008, the committee has met four times. All committee members, the CEO, and the COO have attended these meetings. Members of management have attended on occasion. The focus of the committee has primarily fallen on preparations for the coming summer peak season and on responses to major reliability and public safety incidents, although efforts have been taken recently to broaden its focus. The Committee has, as required, periodically reviewed its charter and the effectiveness of its performance.

a. Summer Preparedness

The Committee received at its first meeting a management presentation on 2007 summer readiness. A 21-page slide deck showed overall resources and demand, graphically depicted the service areas where loads would be excessive absent "investment," and illustrated that, after planned and in many cases already executed actions, the resulting levels would all fall under 100

percent of acceptable load levels. The presentation also depicted in summary form a series of 24 new facilities, reinforcements, and testing and inspection actions that would provide increased capabilities for the coming summer. The presentation closed with a summary of operations readiness, highlighting procedural reviews and updates, training and drills, underground mutual assistance, and the capabilities of the new energy management system.

b. Incident Response

The first Operations Oversight Committee also included a management update on the various stakeholder recommendations resulting from the Long Island City outage of July 2006. The presentation cited the investment of \$90 million, including the establishment of two new feeders, the installation of 160 network transformers, and new breakers to provide improved feeder processing time. A new 230 MW substation was planned by 2011. The presentation also cited outage reporting, Customer Assessment Teams (CATs), customer communication, increased claims amounts, additional mobile generators and outreach vans, and smart meters as network improvements. The presentation closed with a pie chart illustrating the nearly 350 recommendations made by various stakeholders (105 by Con Ed itself, 83 by public service commission staff, and 156 by others).

The agenda and minutes for the second committee meeting (September 20, 2007) addressed only incident response, highlighting the July 18, 2007 steam and the June 27, 2008 Queens transmission outage. A 23-page slide presentation on the steam event summarized the system location and customers affected, provided an incident timeline, briefly described investigative efforts, summarized findings to date, listed questions remaining to be answered, and identified next steps. A seven-page slide presentation on the Queens incident depicted the Yorkville and West Bronx networks where interruptions to 136,700 customers occurred, cited a lightning strike near Queensbridge as the initiating cause, noted that Con Ed's analysis of the event included review of monitoring equipment and data, component testing, and development of simulations to recreate the event, and a review of operator actions, and concluded with a slide listing a number of recommendations to address the underlying causes.

The agenda and minutes for the January 17, 2008 (apart from Committee administrative matters) also focused on incident responses, this time addressing a July 18, 2007 Manhattan steam incident and a November 21, 2008 Sunnyside gas incident. The steam incident presentation summarized the status of actions taken in three areas (process improvements, condensate management, and infrastructure initiatives) to address the factors contributing to the event. A nine-page summary of the Sunnyside (Greenpoint Ave at 48th Ave) gas incident provided an incident and response time line, reported the incident cause (crack in main due to bending stresses on pipe with graphitic corrosion), and noted procedural improvements made, and summarized leak survey and main replacement programs.

c. Broadening of the Committee's Focus

The effectiveness review that the committee conducted in January of 2008 led the committee chair to observe that it needed to seek to find a forward-looking role in exploring operations issues, as the committee moved toward completion of its first year of operation. At its next meeting on June 19, 2008 the beginnings of an expanded committee focus began to be apparent. The subjects of that meeting were:

- ERM (Enterprise Risk Management)
- Gas Transmission Risk.

The COO described the company's enterprise risk program in a presentation that listed the following ERM elements:

- Identify risk
- Assess and rank risks
- Identify mitigation programs
- Develop projects and programs to enhance mitigation
- Consider risk ranking during budgeting
- Monitor mitigation efforts.

The presentation listed the ten highest ranked operational risks in the following areas:

- Electric transmission and substation
- Electric distribution
- Gas operations
- Steam operations.

This Senior Vice President Gas Operations led a risk-management focused discussion of the gas transmission system, its principal risks, the 1998 Hellgate explosion, and gas risk-prevention and mitigation activities.

2. Construction Program Role of the EH&S Committee

The Environmental Health & Safety Committee oversees the company's environmental protection and public and employee health and safety activities. It reviews subsidiary programs in these areas and their compliance with applicable laws, regulations and corporate policies and procedures. Membership consists of at least three persons, none of whom may be corporate officers. The committee must meet a minimum of four times each year, with the power to call additional meetings resting with the committee chair. The charter assigns the following duties to the committee:

- Advise management on corporate environment, health and safety policies and on matters in these areas that management brings to the Committee
- Review significant issues relating to its subsidiary environment, health and safety programs and compliance with applicable laws, regulations, and Company policies and procedures
- Make reviews and recommendations as the Committee deems appropriate on subjects within the scope of its charter and as otherwise deemed appropriate by the Committee to help promote environmental protection and the health and safety of Company employees and the public
- Perform such other functions as the Committee deems appropriate in accomplishing its purposes.

The New York-based President of the American Museum of Natural History (a trustee of CECONY for almost 20 years and director of CEI for almost 10) serves as the committee chair. The other members serving on the committee at May 15, 2009 are:

- A partner at the New York law firm of Dewey & LeBoeuf LLP (a CECONY trustee for more than 20 years and a CEI director for almost 10)
- A New York lawyer (a CECONY trustee for more almost 15 years and a CEI director for almost 10)
- The University of Arizona's President Emeritus (a trustee of CECONY for 20 years and a CEI director for more than ten)

There is cross membership between this and the Operations Oversight Committee (the chair of each serves as a member of the other).

3. Controls Role of the Audit Committee

The Committee assists the Board in overseeing financial-statement integrity, compliance with legal and regulatory requirements, independent auditor qualifications and independence, and performance of internal audit function and independent accountants. The Committee must consist of a minimum of three members, all of whom must meet the legal and the New York Stock Exchange independence and financial literacy requirements. There is an expectation, but not a requirement that at least one committee member qualify under the Security and Exchange Commission definition of "audit committee financial expert." The committee must meet a minimum of six times per year, with the power to call additional meetings resting with the committee chair. The charter also obliges the chair to report to the board following each committee meeting. The charter assigns the following duties to the committee:

- Appoint, (subject to shareholder ratification), set compensation for, pre-approve audit work by, oversee the work of, approve and make required disclosures of any non-audit work by, annually review the plan and the work of, and terminate the work of any independent accountants employed
- Resolve any disagreements between management and the independent accountants regarding financial reporting work, and each such independent auditor will report directly to the Audit Committee
- Obtain and review with the outside accountants at least annually the applicable quality-control procedures applied, any material issues discovered, steps taken to deal with those issues, and the accountants' independence from and relationships with the company
- Review and discuss the annual audited financial statements and quarterly financial statements with management and the independent accountants, including: (a) a review of critical accounting policies and practices and other material written communications with management, (b) a discussion with the CEO and CFO of any significant controls deficiencies, instances of fraud, and the adequacy of company disclosure controls and procedures, (c) a review of the effectiveness of the internal control structure and procedures and the report of the independent auditor on management's assessment of controls effectiveness, and (d) a review of the scope, results, and other annual audit matters deemed appropriate by the Committee.
- Review earnings press releases prior to release
- Discuss financial information and earnings guidance provided to analysts and rating agencies
- Discuss risk assessment and management policies

- Periodically meet separately with management, internal auditors, the independent accountants (at each committee meeting they attend), auditor and the General Counsel
- Prepare the SEC-required report for inclusion in the proxy statement
- Establish and oversee procedures for complaints and anonymous employee submissions regarding accounting, internal accounting controls or auditing matters
- Review at least annually internal audit planning and reports and management actions to respond to internal audit recommendations
- Consult with management regarding internal auditing qualifications and job actions involving the principal internal auditor
- Review any other management, independent accountants', internal auditor and other reports or materials that the committee deems appropriate, with respect to internal controls and accounting practices
- Evaluate at least every five years rotation of the independent accountants
- Oversee compliance programs, policies, and procedures for monitoring compliance, including the Code of Ethics
- Perform such other functions as the Committee deems appropriate in the performance of its duties.

The non-executive Chairman of Newmont Mining Corporation, Denver, Colorado (a CECONY trustee and a CEI director for seven years) serves as the committee chair. Newmont Mining is a large international gold and copper production company that has been in business for about 80 years, \$5.5 billion in annual revenues and \$15.6 billion in assets. The other members serving on this committee are:

- The Senior Managing Director, Millennium Credit Markets LLC, New York, New York (a CECONY trustee for about seven years and a CEI director for almost 10)
- The Executive Vice and Chief Financial Officer, Verizon Communications Inc., New York, New York (and former CFO and Controller of Verizon Telecom), (a CECONY trustee and a CEI director for about one year)
- The Executive Vice President and Chief Financial Officer, ARAMARK Corporation, Philadelphia, Pennsylvania (a CECONY trustee and a CEI director for over two years); ARAMARK is a large international, food-service company with annualized sales in excess of \$12 billion and assets of \$10.5 billion.

4. Board Role in Planning and Budgeting

a. Strategic and Business Planning Guidance

The Board does not formally review recommended strategic or business plans, nor is its approval of management's plans required. Many boards use periodic gatherings of the directors and senior management (outside the context of an agenda-driven board meeting) to generate an open-ended discussion (aided by structured management presentations and sometimes outside participants) of the drivers of strategic plans. CEI does not use this approach. To the extent that the board members have opportunity to contribute to the development of plans as they affect CECONY's network and service plans for the longer term, it occurs "organically," which means through the interaction between members of committees focused on network and service issues and management at committee meetings.

CEI locates responsibility for “articulating” corporate strategy with management, which, at CECONY includes Electric Operations, Gas Operations, Central Operations, and Customer Operations. At a very high level, however, two board committees (the Planning and the Ad Hoc committees) address planning matters generally. The first is the Planning committee, whose formation followed the Gramercy Park explosion, which brought criminal prosecution and an independent monitor of company activities to CECONY. A primary purpose in creating it was to supplement the “action-oriented” committees with one promoting discussion and member education regarding the fundamental internal and external drivers of the business. Committee members do not view the Planning committee as an overseer of the development of strategic or business plans for CECONY. The committee does not focus on planning in a “formal sense,” and does not address plans for network infrastructure or spending.

The committee is the Board’s largest, consisting of eight members, versus the four or five that comprise the other standing committees. The committee does not operate with a fixed set of scheduled annual activities or approval requirements, nor does it seek to make immediate-term contributions. The Planning Committee has met only infrequently (three times between May 2007 and July 2008). Its September 2007 meeting agenda listed management presentations about:

- The process management intended to use to develop plans
- Overall CEI strategy
- Merger and acquisition screening activity
- Review of non-utility business.

The committee planned a February 2008 meeting, but postponed it. The next meeting came in June 2008. It addressed the implications of the current economy for the company, focusing on new load sources, changes in customer use of electricity and gas, and steep rises in copper, steel, and commodity costs, and long-term peak demand projections. Earlier, the Planning committee addressed merger and acquisition issues; those now fall under the recently created Ad Hoc committee, addressed in the following section of this report.

Consolidation of the Planning and Ad Hoc committees is a possibility that some members consider to be a matter for near term discussion. There is also interest among members in moving toward a more “structured” form of operation for the Planning Committee.

One member has described the Ad Hoc committee as focusing on:

- Long-term sustainability of CECONY’s business given the regulatory framework
- Whether CEI should be in other businesses
- How to improve the relationship with the public service commission
- Alternate forms of utility rate regulation.

The board created an Ad Hoc Committee on Corporate Strategy on May 19, 2008 to serve until further Board action and to have the purpose of “considering and reporting to this Board on matters related to corporate strategy issues.” Its members include the lead CEI director (the committee chair), the CEO, and members Calarco, Ranger, and Sutherland. Its creation followed what the Board viewed as a bad result in the last rate case. There was a concern that “the rate

case is the strategic plan;” board members viewed the committee as a means to help move the company beyond that limitation.

The Ad Hoc committee’s first meeting came in June 2008; it addressed:

- Financial projections for next five years
- Rate case, expense reduction, and other revenue options
- M&A Options
- Strategies for improving governmental and stakeholder relations
- Shareholder Value Enhancement
- System Operations and Reliability.

The committee’s second meeting, in July 2008, considered the company’s rate case policy, lobbying, and what were referred to as “other opportunities.”

b. October Review of Budget Drivers

Normal board procedure calls for annual, pre-approval review by the Finance Committee of issues related to the coming year’s capital and O&M budgets. This review takes place at the Finance Committee’s meeting that is routinely scheduled to take place in October, on the day that a full board meeting occurs. The October 2007 meeting typifies the process. All other members are invited to the portion of the committee meeting that involves this discussion of the issues that management considers to be the prime budget drivers for the coming year. The Finance Committee met on October 18, 2007 at 8:30 am, with a full board meeting to follow at 10:00am. The Committee had a long agenda of other items for that meeting; these other items included:

- Review prior quarter results
- Declare dividends on common stock
- Review a series of recommendations and management’s intended responsive actions following a report by PwC on Energy Risk Management (addressing accounting and controls applicable to energy transactions)
- Recommend approval of \$144 million fuel oil purchase plan for Steam Operations for the 12 months beginning on November 1
- Recommend approval of approximately one half billion dollars in increased funding for cable, splices, and cable connectors and hardware
- Recommend approval of the exercise of the company’s option to secure additional fixed-price energy from Entergy Nuclear Power LLC through December 2011, and fixed-price capacity through April 2012
- Issue Gas Installation service contracts for Bronx and Queens
- Review O&R electric rate case status
- Review CECONY electric rate cast status.

Ten of the 12 members were present for the discussion of 2008 budget drivers. The CFO provided an overview of the coming year’s capital and O&M budgets, making reference to an October 18, 2007 document titled “2008 Budget Issues.” The COO, O&R CEO, Controller, and the competitive businesses’ senior officer discussed expected 2008 construction and major O&M

programs, capital plans, financial considerations, and the potential impacts of an uncertain outcome of the pending CECONY rate case.

c. November Budget Approval

Formal presentation by management and approval by the board of the coming year's capital and O&M budgets take place at the November meeting. This approval occurred in 2007 on November 15, when meetings of the full Board, the Finance Committee, the Management Development & Compensation Committee, and the Environmental Health & Safety Committee also took place.

The minutes of the full Board session indicate that very little discussion took place about the budgets, but that they had been discussed at the Finance Committee, whose meeting was scheduled to begin a half hour before the full Board session commenced. All twelve full Board members attended the Finance Committee meeting. Management attendees included the COO, the CFO, the General Counsel, the competitive businesses' senior officer, and the Assistant Controller. The Finance Committee meeting included a discussion of the budgets and the sale of a West 125th Street property. The minutes describe the discussion as the "Final Review of 2008 Operating Budgets for CEI and CECONY and Capital Budget for CECONY." The COO, O&R CEO, and the competitive businesses' senior officer made presentations on CECONY, O&R, and competitive energy businesses, and consolidated CEI. Slide presentations titled "2008 Operating and Capital Budgets" formed the basis of the discussion. The Controller explained the major underlying financial assumptions, quantified major earnings drivers, showed variations from estimates for 2007, and provided the variance between the proposed 2008 budget and the January 2007 estimate for 2008. Management's presentation included budgeted income, earnings per share, the 2008 capital program, a cash-flow statement and a financing plan for 2008. The Finance Committee then resolved to recommend Board approval of budgets set forth in three separate November 8, 2007 memoranda that had been provided to the Board:

- "CECONY Summary of Year 2008 Capital Budget"
- "CECONY Summary of Year 2008 Operating Budget"
- "CEI Summary of Year 2008 Operating Budget and Capital Budget."

5. Construction Program Planning and Execution Oversight

The board members uniformly cited the monthly written summary reports they receive and the briefings by the COO at board meetings to be their sources for information used to monitor capital program budget performance and network operations results. They uniformly state that they receive other regular sources of such information. Two members noted the existence of information about Key Performance Indicators, but it does not appear that the members use them as regular sources of information (apart from their use in supporting an element of executive compensation for which the management development and compensation committee oversees).

The monthly reports that board members receive are titled, "Summary Reports," which they receive in advance of the meetings, even in months where no board meetings take place. The members report that they receive no regular budget or operational information apart from the Summary Reports. The board agendas regularly report the budget and operations presentations as part of an item called "Report of the Company." They consist of presentations by senior executive management to address CECONY operations, finance, and public affairs. These

Summary Reports and the Report of the Company” provide information at a summary level and, in the case of operations data, not in a structured format or with consistent data content.

The nine-page February 21, 2008 Summary Report provided to the Board typifies the level of detail that members routinely get about financial, budget, and operations performance. That report focuses predominantly on high-level financially oriented data, as opposed to budget or operational details. It provides a one-page summary of earnings per share versus budget and last year, for CECONY, Orange & Rockland, competitive business, and CEI total, including a several-word identifier of variance causes. One additional page of detail provides slightly more detail on non-utility earnings per share, but no more utility detail. That page also shows a breakout of mark-to-market and discontinued operations information. The report also includes a one-page summary (in terms of earnings per share) of variances between the current month actual and, (a) budget for the current month, and (b) the corresponding month for the prior year. The categories shown comprise:

- Electric revenue
- Gas revenue
- Steam revenue
- Operations & maintenance expense
- Depreciation and property taxes
- All other – net (including new stock).

These comparisons do not provide year-to-date or rolling 12-month accumulations; they present data only relative to the current month. A following page provides a three-to-five line explanation of the causes of the total dollar variations in these categories.

The following page of the report provides customer accounts receivable and payment lag and it provides summary finance data (stock issued in the month, outstanding short term debt amount and rates). The following page addresses regulatory matters, providing short paragraphs about the CECONY electric rate case, this management audit, and the Orange & Rockland electric rate case. A following page offers a set of major financial statistics: earnings per share, return on equity, interest coverage, book value, and capitalization by component (dollars and percent). The next page shows total assets, cash position, and customer accounts receivable. The last page shows actual monthly sales compared to budget and comparable prior year month for electric, gas, and steam.

The COO provides the operations component of management’s Report of the Company at board meetings. These presentations are brief and focus on events, and not regularly reported, objective data about budget and operational performance, as the following minute descriptions of the list of topics covered indicate:

- June 2007: summer preparations and successful bid to read city water meters.
- July 2007: steam incident
- September 2007: size and date of 2007 system peak, company award for carbon-efficiency improvement
- October 2007: Harlem October 6 gas explosion, partnership with Manhattan College power engineering masters degree program
- November 2007: CECONY’s retirement of direct-current service after 125 years

- December 2007 (meeting focused on the July 18, 2007 Manhattan steam incident): incident overview, consulting work on overall investigation, metallurgical review and mechanical testing, description of causes, completion of repairs, tests, and inspections, company recommendations and action plan, related lawsuits.
- January 2008: record usage in 2007, upcoming events related to the July 2007 Manhattan steam incident
- February 2008: record electricity peak and gas usage reached
- April 2008: recent gas explosion
- May 2008: two new substations reported as becoming operational
- June 2008: heat wave, new peak, conference on stray voltage.

The financial portion of management's Report of the Company includes an earning's-focused financial report that appears to be consistent from meeting to meeting, repeats information provide in the monthly Summary Reports, is brief, and does not address budget performance.

6. Controls Environment

a. Key Controls

Sarbanes-Oxley (SOX) requirements remain a major source of added resource requirements for Auditing. The internal auditors perform about half of the annual SOX work, which displaces the effort and incremental cost that would come through performance by the independent accountants. SOX-related work has, as other companies have experienced, caused the biggest change in auditing workload in recent years. Some other companies use management to perform some SOX testing; Auditing does all of the internal (*i.e.*, excluding that done by the independent accountants) testing for SOX.

The scope of independent accountants' work is now largely limited to auditing financial statements, but they did examine Energy Management's infrastructure several years ago.

The next table shows the numbers of key controls by area. All of them were scheduled for testing in 2008. The CEB-level controls relate to CEI's competitive-energy businesses, which it carries out through three wholly owned subsidiaries: Consolidated Edison Development, Inc., Consolidated Edison Energy, Inc., and Consolidated Edison Solutions, Inc. Exhibit IV.1 describes key construction-related controls.

CEI Key Controls

	CEI	CECONY	O&R	CEB*		CEI	CECONY	O&R	CEB*
Financial Reporting	145				24 Materials & Supplies		6		
Treasury	57				Accounting		2		
Energy Management		55		53	Materials Managements		1		
Accounting		13		13	Obsolescence		1		
Hedge Accounting		6			Physical Inventory Process		2		
Confirmations		1			Payroll		9	9	
Credit Risk		4			Purchasing and Payables		11	11	7
Deal Authorization and Capture		4			Receiving Process		1		
Fuel Procurement and Inventory		4			Vendor Data Management		1		
Gas Supply and Purchased Power		4			Accounting		4		
Portfolio Valuation and Reporting		4			Invoice Processing		4		
Risk Management		4			Processing Cash Disbursements		1		
Fixed Assets		4	17	5	General Information Technology		15		10
Accounting		4			Revenues-Electric and Gas		12	12	10
Capital Additions		4			Revenues-Steam		12		
Capital Budgets		4			Tax		21	21	
Depreciation		4							
Impairments		4			<i>Unit Total</i>	202	158	70	118
Leases		4			<i>Grand Total</i>	548			
Retirements & Disposals		4							

*Competitive Energy Businesses

b. Audit Planning

Auditing performs an annual Risk Analysis, which relates each financial statement line item to a transaction (or SOX) cycle. Auditing assigns each item a risk rating from high to low (A to C). Those ratings form the basis for determining what, how, and how frequently to test. The annual audit plans incorporate a SOX-specific module. Auditing maintains a "Control Catalogue, which contains about 2,000 key and non-key controls. Auditing tested all (both key and non-key) as part of the baseline SOX testing. The group still tests the key controls every year, and the remainder at least every five years. Auditing submits for Audit Committee review in October of each year the Audit Program for the coming year.

The following table summarizes recent year planned and actual Auditing work hours by subject.

Actual Versus Budgeted Audit Work Program Hours

Activity	2006 Actual		2006 Budget		2006 Variance	
	HRs	%	HRs	%	HRs	%
Auditing	50,545	60%	48,570	58%	1,975	4%
SOX Testing	15,930	19%	15,825	19%	105	1%
Unscheduled Audits and Investigations	11,810	14%	13,100	16%	-1,290	-10%
Business Ethics and Corporate Policy	4,110	5%	3,750	4%	360	10%
Audit Support and Special Projects	2,550	3%	2,115	3%	435	21%
Total	84,945	100%	83,360	100%	1,585	2%
Activity	2007 Actual		2007 Budget		2007 Variance	
	HRs	%	HRs	%	HRs	%
Auditing	47,350	58%	51,960	59%	-4,610	-9%
SOX Testing	16,600	20%	16,900	19%	-300	-2%
Unscheduled Audits and Investigations	12,680	16%	12,800	15%	-120	-1%
Business Ethics and Corporate Policy	3,200	4%	4,075	5%	-875	-21%
Audit Support and Special Projects	1,900	2%	2,300	3%	-400	-17%
Total	81,730	100%	88,035	100%	-6,305	-7%

The following table shows trends in recent Auditing work.

Trends in Audit Work

Activity	2008*		2007		2006		2005	
	HRs	%	HRs	%	HRs	%	HRs	%
Auditing	57,020	63%	47,350	58%	50,545	60%	41,035	52%
SOX Testing	13,500	15%	16,600	20%	15,930	19%	21,197	27%
Unscheduled Audits and Investigations	14,100	16%	12,680	16%	11,810	14%	11,050	14%
Business Ethics and Corporate Policy	3,350	4%	3,200	4%	4,110	5%	3,990	5%
Audit Support and Special Projects	1,950	2%	1,900	2%	2,550	3%	2,285	3%
Total	89,920	100%	81,730	100%	84,945	100%	79,557	100%
Organization	2008*		2007		2006		2005	
	HRs	%	HRs	%	HRs	%	HRs	%
Finance	16,090	18%	15,130	19%	14,785	17%	12,625	16%
Customer Operations	12,530	14%	12,990	16%	12,590	15%	10,779	14%
Electric Operations	7,160	8%	5,825	7%	4,500	5%	6,160	8%
Central Operations	6,890	8%	5,480	7%	8,090	10%	8,045	10%
Gas Operations	3,270	4%	2,720	3%	2,150	3%	2,160	3%
Central Field Services	1,720	2%	2,300	3%	2,880	3%	1,760	2%
Energy Management	2,850	3%	1,600	2%	2,225	3%	520	1%
Information Resources	13,030	14%	11,500	14%	10,850	13%	10,275	13%
Purchasing	7,800	9%	9,135	11%	6,135	7%	8,478	11%
Human Resources	400	0%	550	1%	1,370	2%	370	0%
Environment, Health, and Safety	12,880	14%	9,400	12%	12,710	15%	12,110	15%
Business Ethics, Training & Corporate Policy	3,350	4%	3,200	4%	4,110	5%	3,990	5%
Audit Support and Special Projects	1,950	2%	1,900	2%	2,550	3%	2,285	3%
Total	89,920	100%	81,730	100%	84,945	100%	79,557	100%
*Scheduled								

c. Auditing Resources

The Vice President and General Auditor heads the CEI and CECONY audit function. He reports substantively to the Audit Committees of the CEI and CECONY boards and administratively to the CEO. The current Vice President and General Auditor has held this position since about May of 2008. He has been with the company for nearly 30 years, spanning a wide variety of areas. He:

- Began as a meter reader
- Spent about 10 years in Energy Management
- Worked in and later managed the transformer shop
- Worked in stores management in Central Field Services
- Went to Accounting in 1991 to build and subsequently manage the group operating a financial model
- Performed mergers and acquisition work
- Served as Assistant Controller, first managing forecasting and then accounting
- Served as part of the group that set up Shared Services after the O&R acquisition.

Auditing operates across all CEI business units; there is, however, a Rockland Office Administration function. The Project Auditor who heads this function is responsible for local coordination of Orange and Rockland Utilities (O&R) audits. Two Directors and two Section Managers report to the Vice President and General Auditor; each has responsibility for separate auditing areas:

- Director: Customer Operations, Finance, and Procurement
- Director: Environmental, Health, & Safety, Operations, and Information Technology
- Section Manager, Business Ethics and Corporate Policy
- Section Manager, Compliance and Ethics Training.

Each of the two directors has three section managers, who are responsible for one of the three areas (as their titles suggest) under their director:

- Customer Operations, Finance, and Procurement
 - Customer accounting, billing, credit and collection, field operations, and energy-service activities
 - Financial and accounting activities, involving records, statements and procedures relating to assets, liabilities, revenues and expenses
 - Procurement and material control activities, including fuels, purchasing, stores, inventory control and contract administration
- EH&S, Operations, and Information Technology
 - Environmental, health and safety compliance audits and management systems evaluations
 - Management and operational audits focusing on policies, procedures, practices, organizations, resource use, and performance effectiveness
 - Computer information systems and related functions and activities.

The Section Manager, Business Ethics and Corporate Policy:

- Has responsibility for the Standards of Business Conduct
- Coordinates ethics and FERC compliance training and required audits

- Issues Corporate Policy Statements and Corporate Instructions
- Performs Auditing's administration, budgeting and training
- Reviews and updates internal audit procedures and standards.

The Section Manager, Compliance and Ethics Training:

- Designs, plans, and executes training programs
- Disseminates information about the Compliance and Ethics Program.

Auditing's total staffing is 59, which allows annual budgeted audit hours of about 80,000. Concern by Audit Committee members about increasing workload (due to SOX) led to a recent staff increase of three persons. Before that increase, Auditing had reduced its number of annual projects to accommodate the increased SOX load. Since the resource addition, those projects have returned to their former annual level of about 125.

d. Construction Program Audits

The following exhibit shows the subjects and hours budgeted in recent years for examinations of operations and energy procurement groups. Exhibit IV.2 lists recent operations audits. Hours budgeted for operations audits increased from 2007 to 2008, as the following table demonstrates.

Scheduled Operations Audit Hours

Business Unit	Hours	
	2008	2007
Electric Operations	7,160	5,825
Central Operations	6,890	5,480
Gas Operations	3,270	2,720
Central Field Services	1,720	2,300
Energy Management	2,850	1,600
Total	21,890	17,925

The Operations Section, which consists of 10 auditors (up from 7 in the past two years), has responsibility for operations auditing at CECONY. The staff growth in operations auditing has been influenced by the introduction of ERM and by the increased use that CECONY is now making of contractors. The manager of the section has served as a manager in the Brooklyn electric operations, and has an economics background. The staff, which averages about 20 years of experience, includes four electrical engineers, three business managers, a maintenance engineer, and an accountant. With about 6,000 hours per year dedicated to ethics and compliance, there remain hours amounting to perhaps 6.5 full-time equivalent persons for conducting operations audits.

Plans for operational audits result from a number of inputs; *e.g.*, a review of the nature of findings from recent audits, discussions with senior management, a review of the risks identified by the ERM process. Internal Audit management examines how well the audit program covers the issues raised by these steps, and adjusts audit plans to address any needs identified. Operations auditing has focused primarily on whether CECONY personnel follow procedures and regulations, and on the quality of work and training information recording.

One change now underway involves the use of more cross disciplined audits (*e.g.*, combining EH&S and operations); Internal Auditing is seeking to expand the use of this approach. Planning for operations audits has, in the past year, begun to make greater use of the Enterprise Risk Management program's identification of risks. Management of Internal Auditing notes an attempt to do at least one construction audit each year, with test work spanning a project from the contractor bidding process to work completion.

Construction and contractor management have become more important to this section's work, recognizing that the company is now using more contractors. The focus of operations audits of contractor work is adherence to procedures. In the future, management anticipates a greater emphasis on infrastructure work, addressing areas such as performance of maintenance, completeness of records, and adequacy of training. His group has on occasion examined estimated versus actual costs for projects, but has not tested the quality of estimates. Other than a benchmarking of meter shops in the early 1990s, they have not used benchmarking as part of their work. They have also not made use of outside experts.

A major independent accounting firm began a review of Internal Auditing at CEI recently, and was scheduled to share findings and recommendations with the Audit Committee of the board in 2009. The work has looked at conformity with IAA standards, and has placed significant attention on personnel numbers, backgrounds, training, and career paths.

The EHS group within Internal Auditing has a staff of 8. This group, in contrast with many at CECONY, is comprised mostly of outsiders. The group has experienced high turnover, because its members often move to CECONY operating positions after a few years of service. The Company considers this turnover to be net beneficial, because these employees take with them an attitude and view of environmental, health, and safety issues that become infused into the group attitudes of the departments to which they move.

e. Recommendation Follow-up

Auditing routinely prepares and provides for Audit Committee review an "Auditing Operations Report. Review of that report is a common Audit Committee agenda item. These reports list the title of each audit report completed during the previous quarter and the primary organization involved, categorize the controls examined (the categories are adequate and effective, adequate but improvements identified, and control exposure identified), and summarize in a brief paragraph each audit's scope and findings. The Audit Committee also receives recurring SOX 404 briefings through the year. These briefings assess test schedule status, compare findings with those of previous periods, and summarizes the number of significant and recurring deficiencies (the former none-existent and the latter have been minimal in the past year). These auditing operations and SOX reviews occur four or more times per year. The Audit Committee also routinely reviews outside reports at its meetings; examples in the past year include:

- Energy trading review
- Assessment of the Tax function
- Review of the Finance function.

Auditing also provides each quarter an Audit Committee Log that tracks all requests made by Audit Committee members. A SOX Deficiency Report goes each month to the SOX Steering Committee.

f. Corporate Policies and Instructions

The Auditing Department dedicates a senior person (the Section Manager, Business Ethics and Corporate Policy) to assuring that corporate policy and instruction development and circulation are effectively managed. This section manager has over 40 years of experience at CECONY, in a broad range of operations, finance, accounting, and auditing positions. There are two overall corporate policy manuals, one for CECONY and one for CEI. The role of his section in policy and instruction change is to ensure that those controlled by the two manuals undergo established review processes, which include examination by the Corporate Review Committee, which has a large number of members, drawn from each Company organization. His section administers the process of ensuring that all comments received are reviewed and responded to by the organization responsible for the advice and counsel for the new or revised policy or instruction. When a consensus has been reached among the affected groups, his section reviews the changes with the responsible executive. That executive is the CEO in cases of corporate policies or instructions covering multiple organizations; the reviewing authority is the senior executive responsible for the function involved for corporate instructions covering a single organization.

His section also ensures that the correct (and, as needed, updated) version is posted to a Microsoft **Outlook**™ application, which provides all employees with on-line access in “pdf” format.

C. Conclusions

1. The Board’s committee structure addresses oversight of construction program planning and execution, but not in a manner that optimizes its role in program planning and monitoring. (Recommendation 1)

The Board makes representative use of committees, particularly the audit, and finance committees, who, among the committees typical of comparable companies, are most directly involved in matters involving construction program planning and execution. The board also has created committees (the Operations Oversight and the EH&S committees) especially devoted to matters involving the operation of the service delivery assets and networks that result from construction activities. These committees have created significant visibility at the top levels of the Company on operations issues. Their focus, however, has historically had much to do with responding to highly visible incidents. Their creation, in fact, has come largely as part of efforts to respond to such incidents.

The EH&S committee has moved more into a measurement and forwarding looking role and the Operations Oversight committee has recognized a need to find a mission that goes beyond delving into post mortem examinations of incidents. These movements demonstrate a positive evolution of committee role, but there remains a need for the committees to better define their roles, distinguish their missions from each other, identify approaches that will allow board members to examine how well management is identifying needs, seeking optimum long range technical and operational options, anticipating problems, committing resources, and measuring

performance in a manner that will give both a comprehensive picture of current network effectiveness, and will allow for early identification of problems that pose significant reliability and economic risks for the future.

The Board also has a planning committee (two if the current Ad Hoc committee is counted). It serves well as a forum for inviting open ended consideration of long range opportunities and risks, and particularly the economic, market, political, and other environments in which they will present themselves. This aspect of its operation comprises the strength of its mission to be non-action oriented. The weakness of this approach lies in the absence of any other, regular and more structured way for Board members to participate in the development of long range plans (both as they relate to the infrastructure and to other key determinants of future success) as management assesses, formulates, and establishes them.

2. The Board's members have strong capabilities and the Board has shown a commitment to assuring that it maintains the expertise needed to meet the financial and network spending challenges that will drive much of the Company's activities in the coming years. (Recommendation 2)

CEI/CECONY, whose boards operate in common, has exceptionally talented board members. There also exists a sound, board-driven process for identifying and vetting new member candidates. The board has a generally strong mix of skills. It has, in particular, acted in recent years to enhance finance and accounting skills, as those talents have taken "center stage" in corporate America's efforts, such as those sought by SOX legislation at the federal level and exchange-listing guidelines and requirements at the business level. The attention to those attributes, however, should not ignore that assuring effective and accurately reported financial performance of a huge, complex utility business requires just as much, and in fact more, attention to the "blocking and tackling" required to operate the business. Moreover, utilities operate in a special capacity, given their public service mission and responsibilities. This makes their long-term financial performance important to customers as well.

The outside member with the longest tenure and most operations experience has just left the board due to retirement. The former CEO, who has very extensive operations experience will reach retirement age soon. The Board has added a member with significant construction experience. Board members appreciate the need to assure that energy industry experience remains a focus of efforts to develop a list of candidates to fill future openings.

3. CEI applies routine, comprehensive measures for assuring compliance with controls-related SOX requirements.

The Audit Committee's governing documents establish a proper role for overseeing SOX-related efforts. Internal Auditing does much of the work required to support those efforts. It makes a substantial commitment of resources to doing so, and the high level of work it performs, in comparison with the independent accountants, promotes economy. The Audit Committee receives regular reports about the assessment of risk, measures taken to control them, status of gaps or open items related to controls, and the nature and status of measures to close them. The full Board receives regular reports from the Audit Committee about these activities. The efforts that the Board takes in overall management of efforts to secure compliance compare well with

what Liberty has observed at other utility companies, as do the plans and activities of Internal Audit.

4. There is a sufficient program for managing procedures at the corporate level.

There exists a reasonably broad set of procedures that are controlled at the corporate level. Control has been placed within Internal Auditing, and under the control of a very senior manager with a broad range of experience. The section he heads coordinates a process that provides for very broad review of proposed new and changed Corporate Policies and Instructions. The process assigns responsibility for final approval to a suitable executive level. CECONY assures availability and currency of procedures through the use of a system that provides employees with electronic access that promotes retrievability and ease of use, and also serves to assure that employees have an expedient means for assuring that the version they rely on is the most current and is complete.

5. The Board generally reviews construction program planning and execution, and has established committees with responsibilities that focus on key aspects of that program, but the size and complexity of CECONY's infrastructure warrant more structured involvement. (Recommendation 3)

The Board routinely examines and approves budgets for capital and operating expenses annually. The Board's role, however, does not include periodic, structured participation in identification of long-range infrastructure needs, plans, and investments. The Board does receive regular reports from management about budget performance, but in a manner that focuses on financial performance more than on the underlying causes driving expenditure variances and on the performance of the networks at a detailed level.

The Board also receives each year from management a forecast of capital requirements for the next five years. The primary focus of this forecast, however, is to plan financing, rather than to give the Board an opportunity to concentrate on specific infrastructure performance, needs, and plans over the longer term.

The Board reviews construction program controls to the extent that it examines, largely through the lead efforts of the Audit Committee, SOX compliance, audit planning, and audit results.

6. During this audit, the Board demonstrated a commitment to augmenting its role in construction program planning and execution. (Recommendation 3)

In some respects, it would be difficult to be analytically critical of board performance in comparison to other utility enterprises. Some other boards may spend more time on planning and on examination of budgets and performance, but a particularly "hands-on" role with respect to construction program planning and execution is not a common attribute. It is when one takes cognizance, however, of the factors that make such planning and execution more acutely important to CECONY that a more proper context (than raw comparisons with others) for forming conclusions emerges. These factors include the sheer dollar magnitude of CECONY's infrastructure spending needs, its age, the construction and operations challenges of an unusually dense population, the number and nature of incidents that have beset management, the high visibility and (in some cases) hurried responses that such incidents can cause, and, no doubt

others. On top of these factors, CECONY has the added problem of dealing with a regulatory environment characterized not by confidence in management's grasp of the nature and magnitude of required expenditures, but by skepticism.

The recent creation of the Ad Hoc committee, and its focus on "communicating with Albany" and on examination of the regulatory construct and CEI's future business focus underscore board and top management understanding (before this audit ever began) about how critical obtaining concurrence in and rate support for a massive construction program are. The audit did, however, through the "strawman" process, adopted for mutually examining improvement opportunities on overarching issues, produce agreement that the Board can play a more extensive and structured role in construction program planning and execution.

7. Controls address construction program planning and execution, but not in a manner that places an emphasis on cost performance that is commensurate with the expansion in network spending that the Company faces; Chapter XII of this report (*Work Management*) addresses the need for a new CECONY approach to the management of cost.

Key controls, developed primarily as part of annual SOX activities focus on traditional procedural matters. Examples include requirements that expenditures be subject to approved budgets and required approvals for expenditures above budget reflect the required "sign-off." Less emphasized is the question of cost effectiveness and efficiency. Liberty recommends a broad set of changes in work and cost management in Chapter XII of this report. Those changes do not require, per se, a change in the Company's SOX controls, but represent an area of performance that is at least of equal importance to what Congress intended to produce by enacting SOX; *i.e.*, financial statement accuracy.

8. The Board gets substantial information about adverse events affecting network operation and demonstrates significant interest in those events; however, the information that it routinely receives is not consistent in format or in substantial depth. (*Recommendation 1*)

Management customarily provides the Board with detailed information about events and incidents that generate significant public and regulatory attention. That information generally extends from first reports of incidents through the development, identification of root causes, and completion of specific plans and activities to address those causes. The recent creation of the Operations Oversight Committee provides a forum for the detailed discussion of such matters at the Board level. Management also provides occasional reports about the budget status of very large projects.

The Board's regular information packages, however, contain only general information about operations, taking the form one would generally expect in financially oriented documents (*e.g.*, an SEC Form 10-K). This information does not include quantitative data (referred to by some companies as a "corporate dashboard") addressing a comprehensive set of operating or construction performance measures. Moreover, management's regular discussion of operations matters at the Board meetings generally do not address such information, but focus on observations about peak loads and public incidents. Reporting on these matters is appropriate, but the lack of a regular source of more detailed information leaves the board less able to identify

for itself particular issues, concerns, or questions that would be facilitated by a regular and structured source of performance (operating and construction) that is comprehensive.

The Operations Oversight Committee can be a source for reviewing such information routinely, recognizing that there always exists a difficult balance between the depth versus the breadth that a board must seek in providing oversight. That committee has not, at least as of yet, however, chosen to focus on a comprehensive set of metrics to assist it in determining what matters should be the subjects of its focus. Again, the relative size and complexity of CECONY's construction program and activities (and now, the regulatory uncertainties surrounding them) indicate the need for a comparatively greater board focus here, as compared with many other utility companies.

9. Annual audit plans follow from an organized, comprehensive process that regularly reviews and assesses risk, develops audit plans to address those risks, and assigns resources in reasonable proportion to risk rankings and in sufficient measure to accomplish planned work.

Audit planning takes place at a comprehensive, detailed level at CECONY. There is a formal, structured risk assessment process, whose results undergo re-examination as part of annual audit planning. Careful consideration goes to the level of resources required to conduct the activities that result from assessments of risk and methods for examining them. Internal Audit resources have been maintained at a level sufficient to accomplish appropriate audit plans; in particular, the Company has acted appropriately to maintain the resource levels required to continue a comparably high level of operations auditing in recent years.

The Audit Committee of the Board is sufficiently involved in reviewing and approving annual audit plans, overseeing audit results and management follow-up to audit recommendations, and overseeing changes to audit plans as unexpected needs emerge during the year.

10. The Company makes a comparatively strong commitment to operations auditing but has opportunities to strengthen its contribution to network-related construction and operations effectiveness and efficiency. (Recommendation 4)

Given the risk associated with compliance failures and the strong contribution that auditing makes in assuring compliance, it is appropriate that the Company maintain a strong focus on EH&S auditing; however, it would be sound to consider the degree to which the number and seriousness of adverse findings should affect the balance between such examinations and those more focused on cost effectiveness in construction program planning and execution. Liberty believes that such a consideration will lead to a greater relative emphasis on the effectiveness and efficiency of construction-related activities.

The organization structure of Internal Auditing assures adequate resources to conduct financial, operating, EH&S, IT, and other audit activities. It does not yet make significant use of cross-functional capabilities or audits. Some such leveraging of skills and work hours exists, and there appears to be interest in expanding them. Doing so would benefit the Company's examinations of network construction and operations examinations, without necessarily reducing activities in other areas, such as EH&S on an hour-for-hour basis.

The Internal Auditing group dedicated to operations auditing demonstrates a level of operations skill and experience that is noteworthy. Their capabilities give them a particularly strong ability to examine not only procedural compliance, but also effectiveness and efficiency as well. There is some attention to these matters, but they do not represent a principal focus, judging from the nature and type of audit activities performed.

In addition, such review of construction and operations efficiency and effectiveness that Liberty did observe did not make use of analytical techniques to complement analytical and document sufficiency techniques now used (*e.g.*, trends or group versus group comparisons of performance at a detailed level).

11. Internal Audit has begun to use the ERM program's identification of risk in audit planning; that use should be complemented by a more focused examination of capital and O&M cost risks and how operations auditing can address them effectively. (Recommendation 5)

Internal Audit's annual planning employs the evolving Enterprise Risk Management process to the extent appropriate, given the current status of that process. Consideration of the results of that process should, however, become more structured as the process matures.

12. There is an effectively designed and implemented process for follow-up to audit findings.

Internal Audit reports provide clear recommendations subject to effective tracking, conducts follow-up reviews to confirm effective response to findings, and considers the findings in prior audits appropriately in the planning of future audit work. The Audit Committee gets sufficiently frequent summaries of audit findings and management corrective actions to provide oversight sufficient to assure effective response.

D. Recommendations

1. Revise Board Committee Structure to better coordinate functions and to focus on infrastructure planning, oversight, and performance measurement. (Conclusions 1 and 8)

The Operations Oversight committee should focus on identifying in a structured manner the key determinations of long-term network performance against comprehensive plans and objectives. It should move from its prior focus on event and incident post-mortems and response and toward an identification of network needs, gaps, and issues on a proactive basis. Its more recent discussions with management about summer peak season preparedness are a start, but focusing on the next several months, rather than a multi-year period is too limiting. The committee can serve as a primary source of expertise on network planning, design, and performance, although fuller participation by the entire board on network matters is warranted, given the size and complexity of CECONY's utility networks (in all three businesses), as well as the need for establishing the centrality that the Company gives to assuring its stakeholders that proposed expenditures result from a soundly developed long-term infrastructure vision that is accompanied by sound short- and long-term plans, prioritizes effectively, adjusts well to changing conditions, continually measures operational, cost, quality, and safety performance, and husbands resources in a manner that provides for an affordable progression to established vision and plans.

Giving the committee this role will provide an important broadening of the financial focus that the Board, relying in major part on the Finance Committee, has taken in examining and reviewing capital and O&M budgets. The Operations Oversight Committee can and should become the primary source of support for the full Board in examining how budgets address short- and long-term operations needs, and make the critical cost trade-offs that operating with less than unlimited resources will require.

The committee should, working with management, also establish a comprehensive list of operating, construction, (cost, schedule, and quality) metrics for regular reporting, and determine what subset should be the subject of its committee reports to the full Board. The committee should also become active in driving management's operations reports at board meetings to a fuller discussion of quantitative information about performance, short- and long-term network priorities, and relationship between risk (particularly those identified through the Enterprise Risk Management program) and cost prioritization.

The Company should also give serious consideration to the combination of the Operations Oversight and EH&S committees. The challenges, needs, costs, and issues surrounding network operation are very much in common as drivers of the attention of both committees. It will allow for reflection about both sets of issues in a coordinated way, which will promote a comprehensive and fully balanced consideration of all the public and internal factors that drive network plans, spending, and performance.

Finally, the roles of the Planning and the Ad Hoc committees merit discussion. The entire Board can undertake the expanded planning role contemplated by these recommendations without assigning specific new responsibilities to the Planning committee. That expanded role, however, calls into question the future role of the Planning committee, particularly given the existence of the Ad Hoc committee. Liberty believes that a continuation of the open-ended agenda of the Planning committee is useful. Liberty also believes that the effectiveness of this role, as well as the broadening of the entire Board's involvement in the development of plans, can be well served by making the Planning committee the administrator, for Board purposes, of periodic planning exercises and the body that monitors performance against plans as they unfold.

2. Continue efforts to identify board candidates with energy utility experience. (Conclusion 1)

The recent addition of a member with very substantial experience in managing the construction of large projects reflects a sound recognition of the importance that construction program planning and execution will have to CECONY's success now and well into the future. The pending loss of a significant source of CECONY operating experience looms now in the fairly short term. The Board is cognizant of the need for assuring that such experience does not become a gap. Finding an optimum director, particularly in light of the burdens that the position has come to entail for all major U.S. corporations, requires balancing a number of experience, age, diversity, behavioral, and other characteristics.

It is not always possible to place one characteristic (in this case utility operations experience). This limitation may cause difficulty in immediately replacing a particular lost skill. Nevertheless, Liberty understands the Board to recognize the particularly high importance of maintaining this

source of experience. Liberty therefore recommends that efforts to identify a number of suitable candidates be undertaken sufficiently early to minimize the potential for problems in providing continuity. Operations needs are ultimately the paramount driver of construction and infrastructure O&M spending. As the Operations Oversight committee's creation and current search for an optimum future role demonstrate, operations needs, issues, and problems also command a substantial amount of public, and therefore CECONY, attention.

3. Incorporate changes in management's form and schedule for infrastructure planning and budgeting into a more structured, resequenced, and more intensive regimen of board review. (*Conclusions 5 and 6*)

Con Edison's proposal, presented in the form of a board agenda and schedule for planning and budgeting activities as part of the strawman process, represents a sound first start, recognizing two key limiting factors:

- The state of long-range planning that now exists at the management level
- The restraints on changing an already-set Board 2009 calendar for the Board and its members, who, as a group, have major work responsibilities outside of Con Edison.

This recommendation therefore focuses on the period after 2009, which Con Edison's Board and Liberty both recognize as a transitional period with respect to the Board's planning and budgeting activities. The key evolution that Liberty proposes as the following two years progress is to lay out a more logical sequence of Board activities and to identify the required underlying information that will be required from management. Other portions of this report address a number of major changes in construction program planning and budgeting, some of which call for changes in when and how management conducts and documents key activities. The Board should become actively involved in assuring that management makes those changes as promptly as possible. Nevertheless, until those changes occur, certain steps that Liberty would like to see the Board perform soon, are not now practicable. Examples of the management process and document changes at issue are long-range plans, capital and O&M budgeting processes and outputs, and ERM.

The evolution that Liberty seeks should meet the following criteria:

- The planning and budgeting cycle should address in proper sequence the following elements:
 - Identification of strategic utility business and customer issues that will affect service delivery quantities, customer expectations, and competitive landscape
 - Identification of short- and long-term system needs, with a primary focus on infrastructure that must be met to meet key customer-related performance metrics effectively and efficiently as part of a long-range network plan (an effectively applied ERM process should form a significant component of this identification process)
 - Long-term view of system configuration and condition and gaps to be closed and needs met in making that vision a reality
 - One, five, and ten year plans that will move effectively and efficiently toward the long-term view
 - An even longer-term (15-25 year) vision of the major forces and factors shaping the business (as they affect the service-delivery infrastructure) and conceptual views of the type of network (with potential alternatives identified) that will best be able to

- respond to those forces and factors with enough flexibility to support long-term economy and efficiency
- One-year capex and O&M budgets and 5 year look-aheads at capex and major O&M program costs that conform to those plans
 - Measurement of operating, budget, risk mitigation, infrastructure progress and capital application effectiveness performance at the board level (management needs are much more detailed and frequent):
 - Annually to review prior year performance and lessons learned prior to the next annual examination of plans
 - At mid-year to assure sound reallocation of dollars
 - At least quarterly to monitor progress on cost, schedule, and operations performance quarterly (at the board level).
 - Using the current CECONY cycle as a reference point, budgeting should remain the fixed point in time, as prevailing practice is to approve budgets as near in time to expenditures as possible
 - It is appropriate that budgets continue to use a one-year horizon, provided that expenditures expected in the coming year be placed in the context of at least a five-year (and preferably a 10-year) period, with detail level diminishing in the outer years
 - There should be developed a clear and accepted (by Con Edison and the commission) rate plan and regulatory “communications” plan to assure that the substantive changes first made to company planning and budgeting will prove sufficient to generate appropriate regulatory confidence and provide an adequate baseline for the commission to verify significant, lasting planning and budgeting changes
 - Annual budgeting should follow, not precede, estimates of capital expenditures and major O&M programs across a five or longer period
 - Longer-term (5- or 10-year) estimates of future expenditures should result from a long-term network planning process, and should conform to resulting plans
 - That process should be informed by an annual ERM process, objective measurements of progress in improving infrastructure and an “investment value creation” process that summarizes effectiveness over the prior year and looks ahead across 1, 5, and 10-year horizons
 - The Enterprise Risk Management process should lead both planning and budgeting, because it provides a foundation for forming plans and determining areas of needed expenditures
 - The annual financial planning that uses 5-year capex look-aheads can still be performed in January, recognizing that its focus under this approach is financial, not operational planning.

The following sequence of activities represents a possible, realistic way of conforming revised management and board planning and budgeting activities to the preceding list of criteria:

- January - Ops and EH&S Committee:
 - Jointly review past year network and EH&S performance, ERM effectiveness, and infrastructure progress
 - Provide guidance for new ERM report, EH&S performance targets, and any performance measurement changes
 - Stimulate Board discussion of network infrastructure and operations issues.

- March - ERM Report Issued and any performance metrics changes adopted
- April - Ops Committee:
 - Reviews ERM report
 - Discusses major infrastructure needs with management to inform planning process
- May - Long-term planning meeting of Board, supported by management presentation and discussion of:
 - Long-range network plans
 - Capital allocation and project/program selection metrics to guide dollars invested
 - Likely capex and major O&M program purposes, attributes, and expected service results
 - Gross estimate of program dollar magnitudes
- June - Management provides draft of long-term plans and O&M expenditures for capex and major O&M programs
- September - First look at:
 - Budget priorities
 - More refined, but still preliminary estimates of likely spending levels
 - Results of management's capital allocation and selection metrics
 - Major construction/O&M program drivers
 - Relationship to ERM and long-range network plans
- October – Budget explanation to and discussion with Board:
 - Review of preliminary budgets (provided 2 weeks before meeting) by Ops and Finance committees
 - Discussion of committee observations at board meeting
 - Board input to management's preparation of budgets for submission to next board meeting
- November - Budget Approval, with proposed budgets provided to board halfway between October and November meetings.

4. Increase emphasis on efficiency and effectiveness in operations auditing. (Conclusion 10)

Internal Auditing should begin to place a greater relative emphasis on the effectiveness and efficiency of construction-related activities, in order to complement what has been an effective program, but one whose main focus is on procedural and regulatory compliance. In particular, the operations auditing program should increase focus on matters like:

- Controllability of estimate increases (*e.g.*, estimate quality or the reasons/necessity for adding scope, as opposed to verifying that the proper procedures were followed and approval signatures secured)
- Accuracy of reporting of earned work progress or milestones.

Accelerating the current level of cross-functional training and audit assignments will allow this increased level of efficiency and effectiveness reviews to take place within the current overall level of resources. It will also make annual planning more dynamically able to respond to the particular issues identified by annual risk assessment processes (especially as they are affected by the still developing use of the Enterprise Risk Management program) as they change over time. Another effective means for improving the ability to conduct audits focused on efficiency and effectiveness would be to increase the use of quantitative, analytical information (external

benchmarks and best practices, as well as comparisons of performance results and methods differences among groups in different areas of the CECONY footprint). This capability would be enhanced by occasional use of outside expertise (or resource trading from other comparable national and international operations) and by assuring that there is a structured, comprehensive approach to training and development programs intended to expose staff to methods and practices used by others in the industry.

The changes recommended to operations auditing should be recognized as taking what is already a comparatively strong program to what would make it, in Liberty's experience, a particularly advanced one that can serve as a model program.

5. Make consideration of Enterprise Risk Management a more structured part of audit planning. (Conclusion 11)

CECONY appears to be making ERM a more central part of its planning and operations over time. The Company has compared its results to budget in order to determine the degree to which expenditures end up responding to the risks that ERM identifies and classifies. As CECONY moves to the use of ERM to drive budgets (as opposed to a lens for examining budgets after approval), another natural enhancement would be to make ERM results a central element of risk assessment as it progresses. As Liberty understands the current approach, consideration of ERM results occurs in parallel with or possibly even after the risk assessment process that Internal Audit uses to plan.

Exhibit IV.1: Key Construction-Related Controls

Line	Org	Objective	Business Risk	Control	Audit Procedure
32	Corp. Acctg.	Capital budgets appropriately approved	Inappropriate modifications cause to exceed set amounts	(Significant) Capital budgets approved by individuals with authority	Sample capital budgets; verify appropriate approval
33	Corp. Acctg.	Capital budgets set to limit expenditures	Expenditures exceed set plan	(Significant) Overages reviewed by management	Verify overages review and documentation maintenance
1	Purch.	Purchase order amendments authorized	Orders amended after approval; unauthorized acquisitions and misstatement of expenditures	(Significant) Amended orders subject to same authorization as originals	Sample amended orders for proper authorization
38	Corp. Acctg.	Pre-payment invoice check for description, unit prices, correct arithmetic, discounts, special terms	Incomplete data may result in delayed processing or incorrect invoicing	(Significant) Invoices are checked for description of goods/services, unit prices, correct arithmetic, discounts and special terms prior to being approved for payment	Sample invoices for accuracy; verify proper, pre-approval payment
59	Corp. Acctg.	Cash disbursements accurate and valid	Unauthorized or inappropriate payments remain undetected	(Significant) Large and unusual disbursements reviewed by management	Sample disbursements; verify timely management review and follow-up
18	Corp. Acctg.	Initiate, process and record additions for completeness, existence, accuracy	Capitalized costs not recorded correctly	(Significant) Project managers review material and labor costs posted for accuracy and appropriateness, and timely review discrepancies/budget variances	Sample costs posted for accuracy and appropriateness; ensure review completed and documented, and discrepancies/budget variances investigated
5	Purch.	Purchase orders appropriately authorized	Unauthorized purchase orders result in unauthorized acquisitions	(Significant) Purchase order approval limits configured within the system to conform to company policy	Verify purchase order approval limits configured in system to comply with the Delegation of Authorities; sample purchase orders to verify proper approval
7	Purch.	Purchase orders issued only after approved requisition	Purchases without proper authorization	(Significant) Purchase orders issued only after requisition created/approved	Sample purchase orders/requisitions to determine prior creation and proper approval of a requisition

Line	Org	Objective	Business Risk	Control	Audit Procedure
57	Corp. Acctg.	Unusual variances between actual/budgeted expenses investigated	Unusual variances between actual and budgeted amounts not caught	(Significant) Unusual variances between actual budgeted expenses investigated	Verify management investigation and documentation of unusual variances between actual/budgeted amounts
84	Corp. Acctg.	Clear project accountability maintained	Accountability not established	Responsible person for each project recorded in the system	Verify recording in the system and documentation of person responsible for each project
34	Corp. Acctg.	Changes to projects are monitored	Unauthorized changes go undetected	Capital budget changes reviewed by management	Verify management performance and documentation of review process for capital budget changes
82	Corp. Acctg.	Budgets are established for all projects	Inappropriate budget modifications cause expenditures to exceed set amount	Project budgets established/structured to reflect business requirements	Sample project budgets to verify existence, structure, and documentation to reflect business requirements
83	Corp. Acctg.	Project budgets v. actual expenditures tracked	Project expenditures exceed budget	Reports compare Budget vs. Actual, to ensure adequate project funding	Verify existence/documentation of reports comparing budget vs. actual to ensure adequate project funding
11	Purch.	Creation/maintenance of purchase orders appropriately restricted	Unauthorized purchase order entry or modification causes cost mis-statement or unnecessary acquisitions	Restriction of access to create/maintain purchase orders	Test that only such authorized employees can create or modify purchase orders
19	Purch.	Goods receipts recorded completely and accurately	Failure to record receipts accurately causes inventory value/quantity mis-statement	Receipts recorded accurately and at time of receipt	Sample receipts to determine accurate and timely recording of goods received
20	Purch.	Goods receipts exceeding tolerances examined	Undetected discrepancies quantities purchased and received	Goods receipts exceeding tolerances monitored/investigated	Evaluate effectiveness of the methods to monitor that goods received do not exceed tolerances
3	Cntrl. Field Serv.	Inventory valued/posted correctly	Mis-statement of inventory value or erroneous transaction posting	Posting materials and supplies transactions limited to authorized users	Test that only authorized users can post materials and supplies transactions

Line	Org	Objective	Business Risk	Control	Audit Procedure
10	Purch.	Services purchased under approved purchase order	Unauthorized purchase of services	Purchase orders created/approved for all service purchases	Sample of purchase orders to verify approved purchase order for service purchases
16	Purch.	Creation/maintenance of requisitions appropriately restricted	Unauthorized purchase requisitions result in unnecessary or inappropriate procurement	Purchase requisitions created/maintained by authorized users	Test that only authorized users can create/maintain purchase requisitions
15	Purch.	Purchase requisitions are sequentially pre-numbered	Non-sequential numbering makes auditing transactions difficult	Purchase requisitions documents uniquely numbered	Verify that system generates unique purchase requisition numbers
22	Purch.	Goods received accord with quantities purchased	Quantities received vary from those authorized for purchase	Receiving tolerances enforced; quantities received within acceptable range	Evaluate measures to ensure that goods received do not exceed tolerances
34	Purch.	Alert issued when price deviates from contract	Procurements at higher than planned costs	Systems configured to alert users of variances between the PO and invoiced price	Test system alerts for variances between PO and the invoiced price; verify appropriate steps to resolve variances
2	Purch.	Appropriate users able to release purchase orders	Inappropriate purchase-order release cause purchases not reviewed by management	Issue of purchase orders restricted to authorized personnel	Sample purchase orders to verify issuance by authorized personnel
53	Corp. Acctg.	Key invoice fields not modified after initial entry	Payments to vendors may not be made in accordance with the payment terms	Ability to modify open invoices appropriately restricted	Test that only authorized personnel can modify open invoices
50	Corp. Acctg.	Ability to post invoices/credit memos, release invoices appropriately limited	Inappropriate payments to vendors or mis-statement of liabilities	Ability to post credit memos or release blocked invoices restricted to appropriate users	Test that only authorized personnel can post invoices/credit memos and release blocked invoices

Line	Org	Objective	Business Risk	Control	Audit Procedure
12	Corp. Acctg.	Appropriate users able to release purchase requisitions	Unauthorized purchase requisitions cause unnecessary or inappropriate procurement	Ability to release purchase requisitions restricted to authorized personnel	Test that only authorized employees can release purchase requisitions
41	Corp. Acctg.	Purchase orders, goods receipts, and vendor invoices are matched	Payments processed for goods not received or priced inappropriately	System configured to perform automatic matching of invoice, receipt, purchase order	Determine that system automatically matches invoices to receipts and purchase orders; sample invoices to verify all documents are accurately matched
9	Purch.	Purchase orders limited to contracted amount or total ordered	Unauthorized purchases in excess of contracted amounts	Cannot process PO for amounts exceeding Blanket PO terms	Sample of blanket purchase orders to test that amounts cannot exceed contract terms; determine allowable tolerance for all Blanket Pos

Exhibit IV.2: Operations Audits

Audits of Electric Operations

Subject	Hours	
	2008	2007
Cable & Subsurface Operations	300	0
Contract Administration-User Controlled Contracts	0	255
Field Operations	0	600
I&A Services Operations	600	0
Interference Payments	350	0
Vault Rental Payments	0	750
Emergency & Environmental Operations Follow-Up	0	600
Engineering & Planning-Energy Services-High Tension Services	300	0
Engineering & Planning-Harrison Scaffolding Incident Follow-Up	140	0
O&R-Electric Operations	300	0
O&R-Electric Quality Assurance	0	350
O&R-Rubber Goods	300	0
Overhead Clearances	600	0
Overhead Specification Compliance-Burndy	0	350
Pole Transportation and Public Safety	500	0
Staten Island Energy Services	300	0
Accident Investigations	120	120
Unscheduled Audits and Special Investigations	3,350	2,800
Total Electric Operations	7,160	5,825

Operations Audits of Gas Operations

Subject	Hours	
	2008	2007
Gas Engineering-Code 753 Mapping & Contractor Training	300	0
Gas Engineering-Leak Surveillance	300	0
Gas Engineering-Transmission Engineering	0	400
Gas Operations-Drug Testing	250	0
Gas Operations-Gas Contractors	600	0
Gas Operations-Gas Distribution Services -All Areas	0	600
O&R Gas Operations	0	400
Accident Investigations	120	120
Unscheduled Audits and Special Investigations	1,700	1,200
Total Gas Operations	3,270	2,720

Operations Audits of Central Operations

Central Engineering-Contractor Engineering-Design Quality	300	0
Construction-Contractor Oversight Program	300	0
Construction-Field Operations	0	400
Construction-Interference Procedures and Practices	0	400
Construction-Subsurface Reconstruction	500	0
Construction-Van Nest Shop Operations	300	0
Cost Saving Project Review	100	100
Emergency Drills	80	80
Facilities Operations & Maintenance	300	0
Facilities Security Review	0	400
FERC-NERC Compliance	340	0
Steam Distribution-Field Operations	300	0
Steam Operations-East River Plant-Operating Orders	200	200
Steam Operations-Steam Distribution	0	380
Substation Operations-Operating Orders-Bronx/Westchester	300	0
Substation Operations-Operating Orders-Brooklyn/Queens	0	400
Materials & Supplies-Accounting, Materials Management, Physical Inventory	300	0
Substation Operations-Transmission Line Maintenance	300	0
Underground Transmission	0	300
Accident Investigations	120	120
Unscheduled Audits and Special Investigations	3,150	2,700
Total Central Operations	6,890	5,480

Operations Audits of Central Field Services

Subject	Hours	
	2008	2007
CECONY and O&R-E-Z Pass Administration	0	300
Garage Operations	300	0
Materials & Supplies-Data Management	0	525
Materials & Supplies-Materials Management	0	55
Accident Investigations	120	120
Unscheduled Audits and Special Investigations	1,300	1,300
Total Central Field Services	1,720	2,300

Operations Audits of Energy Management

Subject	Hours	
	2008	2007
Energy Management		
CECONY and O&R-Allegro Risk Management System-Pre-Implementation Testing	300	200
CECONY and O&R-Energy Management-Confirmations	0	400
CECONY and O&R-Energy Management-Contract Administration	0	500
CECONY and O&R-Energy Management-Credit Risk	0	400
CECONY and O&R-Energy Management-Process Controls	550	0
CECONY and O&R-Natural Gas and Oil Purchases for Fuel	500	0
CECONY and O&R-Natural Gas and Oil Purchases for Resale	500	0
Competitive Energy Businesses-Energy Management-Process Controls	600	0
Gas in Storage	400	0
Price Reporting to External Publications	0	100
Total Energy Management	2,850	1,600

V. Incentive Compensation

The goal of Liberty's examination of incentive compensation was to evaluate how well it aligns personal incentives with performance and priorities.

CEI/CECONY incentive compensation elements generally display the standard elements. The long-term incentive program for management and board members is generally structured like that of other similar utilities. CEI/CECONY apply the long-term incentive awards strictly according to its objective measures; there has been no, "after-the-fact" resetting of targets.

There are, however, some design weaknesses. The annual bonus plan over-emphasizes the meeting of the O&M budget (through the combined impact of the two closely related metrics of net income is O&M expense). The lack of a direct measure that holds managers accountable for completing work programs allows them to stay within budget (and earn awards) by not getting budgeted work done. There should be a greater use of operational performance metrics for group and individual performance. Adding those measures will be difficult, because of the lack of uniformity in performance measures as one goes down through the organization.

Liberty also observed an unusual absence of formal performance reviews for officers. Such reviews are typically (and effectively) used by many to determine and substantiate executive awards. Moreover, the method used to set the size of the annual funds for distribution is overly complex. At the non-executive level of management, the percentages of salary at risk (subject to cash bonuses and long-term incentives) are low.

Liberty believes that the Company should make changes that will support achievement of important goals: (a) simplifying the plans, (b) restricting the high levels of discretion that can be exercised in the plans, (c) reducing the emphasis on O&M expense, (d) adding capital expenditure and operating performance measures.

The administration of CEI/CECONY incentive compensation programs is effective. The programs operate under adequately structured systems, processes, and documents. The board¹ gets sufficient information and has access to leading sources of outside expertise to oversee the design of incentive compensation programs, assess their competitiveness, and examine their administration. Reporting of progress against compensable goals and objectives is effective.

A. Background

A key part of Liberty's examination of the area of corporate mission, objectives, goals, and planning was to evaluate how the company uses compensation programs, and more particularly, the incentive-compensation elements to align management attention, effort, and performance with the company's mission, objectives and goals. Base compensation, or salary, does not generally tie directly to measured performance goals in a particularly tangible way. CEI, like most companies, uses so-called merit pay increases, but they are not, in the sense used here, incentive compensation (*i.e.*, rewards for performance against specific performance goals).

¹ See Chapter IV for a discussion of the common structure and operation of the CEI and CECONY boards.

The tie between compensation and performance comprised Liberty's primary study emphasis, but the team also examined the role of incentive compensation in the broader context of compensation, including governance and administrative aspects. This additional focus is warranted because a significant weakness in some other part of a compensation program had the potential to make an evaluation of incentive compensation alone misleading.

Organizations use incentive compensation on the assumption that it will affect behavior (*i.e.*, that that employees are motivated by money). Accordingly, an incentive-compensation scheme should induce desired behaviors. The design and operation of compensation programs, to be successful, must, at least:

- Mesh with the culture of the organization
- Tie the receipt of incentive compensation to the desired performance
- Provide sufficient incentive.

The established objectives should be achievable, within reason. Those that are too easy to achieve allow the incentives to be earned without having induced strong performance. Objectives that are too hard (so as to be perceived as likely to be unattainable) tend strongly to make the extra effort not worth the remote chance of earning extra pay.

This is a time of much national focus on the wisdom and failure of incentive-compensation programs at many large corporations. Despite the useful debate spawned by that focus, the broad principles of modern compensation programs are likely to continue to be the basis for decisions by boards of directors and top management. These principles are usually grounded in the goal of establishing programs designed to pay at a level that enables a company to attract and retain the people it needs to succeed, to provide incentives for executives and other managers to perform to shareholders' expectations, and to align the interests of program participants with the interests of shareholders. The board, as described in the company's proxy statement, endorses these principles; it would be surprising if it did not.

Behind the complexity and good intentions of a compensation program, however, is the simple issue of whether it is competitive (*i.e.*, reasonably close to the relevant market), or if it is rich, and if so, does it generate sufficient value from the performance it induces to justify its costs. The issue of how competitive a company believes it must be, and against whom it competes for its top talent, is, obviously, important. The executives and managers of utilities may turn over less than their counterparts in other industries; however, comparative stability does not mean that movement and poaching of talent may be ignored. Competitiveness remains a legitimate concern in enterprises like CEI.

Answering questions about the effectiveness of incentive compensation programs requires substantial judgment, given the difficulty of linking performance and pay in complex organizations, particularly ones that operate under significant public-service requirements and expectations. The judgments must be informed, particularly now, by the experience that pay-for-performance has typically been good, especially for executives, when things are going well, but is not symmetric in assuring that executives make sacrifices in the form of substantial decreases in pay when a company does not do well; *i.e.*, even as some or all of shareholders, other employees, and customers suffer. Having the right principles may be a necessary condition, but

execution is the more telling measure of whether an incentive-compensation program fulfills the needs for which it was designed.

The ultimate responsibility for the design and implementation of CECONY's incentive-compensation program lies with the board. U.S. corporation boards typically use committees to digest, report on, and make recommendations about details of the issues it address. CEI uses its management development and compensation committee (MD&C Committee) to address compensation issues, including those at issue here. This committee uses an independent advisor, (a compensation consultant) to help it carry out its responsibilities. CEI employees administer the incentive program, and provide advice on program changes that may be warranted. Compensation consultants can provide counsel, analysis, and data on many topics needed by a board compensation committee, including:

- Choosing companies to be used for comparison
- Components of compensation packages
- Competitiveness of pay
- Degree of compensation put at risk by other companies
- Use and levels of cash- and share-based incentives.

Compensation consultants typically use databases of proprietary (survey) and public information to make their comparisons, including analyses of benchmarked positions. This benchmarking consists of matching and adjusting positions of client-company executives with those in other organizations, and making adjustments for differences in position responsibilities and company size. Compensation consultants use *scope* measures to compare their client against other employers, and normalize the differences to make comparisons valid. For instance, they can use market capitalization (the value of outstanding shares) as an indicator of the responsibility that having a position entails. Another scope measure is number of employees. The revenues of a company are, however, the measure of scope most commonly used. This is the scope measure that CEI and its consultants use. Data on revenues are readily available. There can be significant limitations in the validity of revenues as the measure of scope, but it is the accepted measure used by compensation consultants.

Probably the most important factor in setting compensation is choosing the organization's competitive position, which consists of determining those against whom the company should be measured and at what percentile compensation midpoints should be targeted. In Liberty's experience utilities often choose the 50th percentile as their benchmark; CEI employs this common practice. The rationale for choosing that positioning can merit examination, although generally it is not something that employers subject to detailed, objective analysis. The pick of the percentile objective cannot be examined in isolation, however, because poor choices of companies and positions within companies against which to compare can make an apparent competitive position of percentile rank meaningless.

The criteria by which Liberty evaluated incentive compensation included the following:

- Clarity / comprehensiveness of documentation
 - There should exist clear definitions and documentation of the programs of executive and management incentive compensation.
 - The documents should be current.

- The documents should be consistent in philosophy and facts with the proxy statement.
- The board should have full control over the establishment of executive compensation.
- The board should exercise that role in a manner that focuses sufficiently on utility performance when deciding how to reward executives with significant utility responsibilities.
- Analytic support - benchmarking
 - The comp committee and management should have sufficient analytical support.
 - The HR department and comp committee should have supportable reasons for incentive-compensation practices.
- Incentive levels and ties to performance
 - Compensation programs should align rewards with the achievement of objectives that tie to responsibilities of different levels and functions.
 - Compensation should be based on sound benchmarks which should be carefully applied to assure that there is a strong link between compensation and value to CECONY.
 - Measures used for incentives should primarily be objective, and where customers bear those costs should be related to utility service and cost.
 - The recent history of incentive payouts should show that there is no assurance that incentives will be paid at high levels absent effective performance.
 - The levels of potential incentive payouts should be sufficient to induce desired behavior and focus.
 - The performance-review process should support the connection between pay and performance.
- Use of stock-based compensation
 - Use of stock-based incentives compensation should be like the programs of companies who compete for similar talent.
 - Stock-based compensation of board members should be similar to that of others against whom CEI competes for directors.

B. Findings

1. Program Documentation

CEI uses a variety of different documents to codify, explain, and record the results of its incentive-compensation program. The program is made up of two plans that provide opportunity for Con Ed employees to earn annual cash bonuses:

- Management Variable Pay (MVP) Plan for CECONY employees who are not in the bargaining units and who also are not officers
- Executive Incentive Plan (EIP), for officers except for those who work for Orange and Rockland and CEI's non-regulated business.

CEI also offers its management employees the Long-Term Incentive Plan (LTIP). This incentive pays employees in stock or the cash equivalent at the end of three-year plan cycles that can start anew every year. Starting in 2007, CEI changed the form of stock-based incentive compensation to restricted stock units only; before both restricted stock and stock options were used.

Recent legal documents describe each plan. There also exists a more than 40-page brochure that describes the operation of the MVP Plan in detail. Further, the human resources department annually distributes a memorandum on compensation that includes specifics on how CEI's MVP Plan and LTIP will have effect for management personnel.

Management personnel use a form to record the company's and their own targets for performance indicators, which provide the quantitative operational measures used in the EIP and the MVP Plan (described in detail below) and their actual performance against targets.

CECONY's executives have access, through a system, to information on their subordinates' incentive awards, and also get visual summary comparative information on that variable (incentive) pay.

Finally, every year CEI sends a proxy statement to its shareholders that Liberty found accurately explained the current workings of the incentive-compensation program with respect to executives.

2. Board Role

Liberty reviewed (for the period from January 2007 through the third quarter of 2008) the documents supplied to the MD&C Committee in connection with their meetings, the minutes of the committee's meetings, the relevant meeting minutes of the full board, and resolutions on incentive-compensation topics. With respect to incentive compensation specifically or compensation generally, the documents mainly described changes to plans suggested by management or the board's compensation consultant, presentations by the compensation consultant on various other topics (some of which are described below), and documents that provided the bases for approving actions regarding pay.

For example, the board approved or was informed about:

- Increases in the salary of CEI's CEO
- Design of the EIP, including the weighting given to operational measures
- Ratio of the CEO's compensation to that of other employees
- Composition of the compensation peer group
- Positioning of CEI's LTIP compared with other employers
- Other decisions and actions included changing the weighting assigned to a CECONY performance measure, engaging the compensation consultant, and approving the initial grants and payouts of the MVP Plan, the EIP, and the LTIP.

CEI's CEO sends a memorandum each January to the MD&C Committee to request approval for the awarding of cash bonuses. The memo describes the specifics of how the three types of targets used for the EIP were or were not met, and thus how the award fund (bonus pool) would be set according to formula. The memo also provides a detailed multi-page narrative of performance for the year, by subsidiary. The CEO also provides a recommendation as to whether there should be a change to the award funds (pools) available to pay bonuses under the EIP, the annual cash bonus for each executive, and the stock grants for each executive.

3. Analytic Support Used to Address Incentive Compensation

In 2007 and 2008 the MD&C Committee received several presentations from its compensation consultant (the Compensation Consultant), one of the world's leading firms in the field.

In January 2007, the Compensation Consultant provided the results of a study of the competitiveness of the compensation of CEI's chairman and CEO. Con Ed was at the median in size, as measured by revenues, among the 20 utility companies against whom the Compensation Consultant made the comparison.

The Compensation Consultant found that the CEO's pay in 2005 placed him at the following percentiles:

- [REDACTED] for base pay
- [REDACTED] for cash bonus
- [REDACTED] for total cash compensation (base pay plus cash bonus)
- [REDACTED] for the percentile of base pay at risk under the long-term incentive program at the target award level
- [REDACTED] for total direct compensation (base pay plus cash bonus plus long-term incentive opportunity, at the target award level).

In April 2007 the Compensation Consultant reported that CEI's use of measures of corporate performance for incentive compensation was in line with industry practice. The Compensation Consultant also reported that the ratios of CEI's CEO's base pay and target cash compensation (TCC—base plus bonus at the target level) to the base pay and TCC of a sample of CEI management positions were generally similar to that of the utility industry. The Compensation Consultant also presented information that showed that the base, TCC, and total direct compensation of CEI's CEO, COO, and CFO, were below the market medians, and especially because their long-term incentive opportunities (at the target award level) were below the medians.

In November 2007 the Compensation Consultant reported to the MD&C Committee on the competitive position of CEI's pay for its top five executives compared with its peer group, using proxy-statement information. The result was that the executives were about at or below the market median. Using survey information on more companies, the Compensation Consultant found that CEI's officers, taken together, were at the market median for the various components of pay.

The Compensation Consultant reported to the management development and compensation committee in April 2008 that CEI's executives' 2006 base salaries were appropriately aligned to revenue levels (the standard measure) but that total cash and total direct compensation were below the [REDACTED] percentile.

CEI uses the services of a second compensation consultant (the Second Compensation Consultant) for similar services on compensation topics regarding non-executive management employees. The results of some analysis that this other consultant, also a leading compensation-consulting firm, performed for CEI, is described below.

4. Operation of the Incentive Program

a. Classes of plan participants

The MVP Plan in its current form started in April 2006. It covers all management employees who are not officers.

The EIP covers all officers. The plan, in legal form and in practical application, recognizes the differences in responsibilities and pay among the officers. The executive officers are:

- Chairman and CEO
- Executive Vice President
- Senior Vice President (SVP) and Chief Financial Officer (CFO)
- General Counsel
- President and (COO) of CECONY
- SVP – Business Shared Services
- SVP – Enterprise Shared Services
- SVP – Public Affairs
- VP and General Auditor
- President and CEO of O&R
- Group President – competitive energy businesses.

The executive officers are sometimes referred to as *certain officers*, for purposes described below. Senior officers consist of those SVPs not designated as executive officers.

Outside board members are participants in the LTIP for the purposes of covering their grants of restricted stock, as described later.

A modest part of the compensation of CECONY's non-management employees depends on their performance. The current contract between CECONY and its bargaining units provides that 0.5 percent of the annual 3.5 percent merit increase is subject to the outcome of each union employee's performance review. Liberty judged this level of opportunity to be too low to qualify as incentive compensation for the purposes of this audit.

b. Recent history of establishment of the plans

The LTIP started in 1996. Before that, starting in the 1980s, there existed a discretionary bonus program for executives; it relied primarily on stock options. The plan changed over time because the payouts were too small. CEI's stock price changed little; therefore, options were not valuable. This was a reason for the change to restricted stock. In 2004 the LTIP for officers changed to options plus restricted shares, and then for the 2007 awards (awarded in 2007, paid in 2010) for all management employees the LTIP was changed to restricted shares only.

As noted above, 2006 was the first year that the current forms of the annual bonus plans (MVP Plan and EIP) were in effect; both started many years before.

c. Structures and mechanics of the plans

i. Tying annual incentive-pay to performance

The annual incentive plans for all management employees have a common structure as it pertains to connecting the receipt of a bonus and performance. All tie some portion of the bonus to:

- Meeting the target for achievement of company net income
- Staying within operations and maintenance expense (O&M) budget
- Meeting performance indicators.

The annual incentive for CEI's top executives ties solely to their achievement of quantitative measures of performance, unless changed by the board or CEI's CEO (with the exception of the CEO's bonus). The table below shows the target measures for the executives within the group of the certain officers.

2008 Executive Incentive Plan Calculation for Certain Officers (%)

	Chmn. CEO CEI	Pres. CEO O&R	Pres. COO CE	SVP & CFO	SVP BSS	SVP ESS	SVP Public Affairs	General Counsel	VP Gen Auditor
Adjusted Net Income									
Adjusted CEI Net Income	50			50				50	
Adjusted Regulated Net Income		50	50		■	■	■		■
Financial Performance									
CECONY O&M Departmental Budget	18		20	18	■	■	■	18	■
O&R Operating Budget	1	20		1	■	■	■	1	■
CEB Financial Performance	1			1				1	
Total	20	20	20	20	■	■	■	20	■
Operational Performance									
Total CECONY	28		30	28	■	■	■	28	■
Total O&R	1	30		1	■	■	■	1	■
Total CEB	1			1				1	
Total	30	30	30	30	■	■	■	30	■
Total payout	100	100	100	100	100	100	100	100	100

For the preceding table, allocation percentages for financial and operational performance were based on forecasted 2008 budgets. Adjusted CEI Net Income is CEI net income less mark-to-

market charges and extraordinary non-recurring items. Adjusted Regulated Net Income is CECONY net income plus O&R net income less any extraordinary non-recurring items. BSS stands for business shared services and ESS means enterprise shared services. CEB is competitive (non-regulated) energy businesses.

Written performance reviews are not used for any officers, even though individual performance is a factor, except for the named executive officers, for whom individual performance is not normally a part of the process for determining their bonuses. The change to relying only on performance indicators for the named executive officers took effect in calendar 2007, for payments made in 2008. The change was made to assure shareholders that CEI was using only objective measures (net income budget, operational performance, and individual performance) for incentive compensation for this group. The board, however, has the authority to make adjustments, and CEI's CEO can, and does, recommend adjustments.

The following chart shows how the weights of the three quantified and individual performance factors change with position:

Annual Incentive Distributions by Rank and Performance Factor (percent)

	Organization Senior Officer	Group Officer	Department Bands 1 - 4

Note the designation organization, group, and department. They refer to a specific organization hierarchy which then changes the hierarchy of measurement, which is discussed below.

Taken together, the assignment of weights to the quantitative factors matches declining responsibility for meeting the net-income and budget targets with lower positions, and the converse is true for performance indicators. This approach is standard in compensation programs, and reflects the idea that increasing organizational responsibility is correlated with accountability for performance on behalf of stockholders and ability to control outcomes at higher levels.

For non-executive management personnel, the connection between annual incentive (MVP Plan) and performance includes the three primary performance-factor categories shown above (net income, budget, and operational performance), which, without a change by the responsible supervisory officer, accounts for ■ percent of the receipt of the annual incentive at the targeted level, and the results of written performance reviews, the individual component, which accounts for the balance of the calculation of the annual incentive.

The degree to which bonuses can be adjusted is constrained by the size of the target incentive funds—the bonus pools; the process for determining their size is explained in the next subsection.

ii. Determining the sizes of the annual bonus funds

The actual bonuses in Con Ed's annual-incentive program are set by successive levels of supervision, who are allowed to change an award from the amount that would result from a calculation; *i.e.*, simply doing the math for the officer group, or making the calculation for the non-officer managers and adding the score that results from individual performance reviews. The amount of the change to the straightforward calculation is, however, constrained by limits set on the amount of money that can be distributed for bonuses.

Those limits come from a calculation that determines the size of the potential bonus cash pool. For both the EIP and the MVP Plan the concept is the same. The plans have award funds equaling 100 percent of the base salaries of all participating employees multiplied by the targeted percentage of base salary that is the expected bonus amount, and multiplied again by the achievement by the business unit (CECONY is the relevant one here) of its performance objectives.

The MVP Plan uses three pools:

- The highest non-officer salary group (band 4, a group of positions)
- The next level (band 3)
- The largest, which has the remaining managerial employees, down through the entry-level positions.

CECONY officers with the title of Senior Vice Presidents or above have the discretion to move money between the three MVP pools after the results of the year determine the size of the pools. The pools are then further distributed to organization units for awards to individuals.

As noted above, the final factor in determining the size of the pools is a business unit's achievement of performance goals, the key indicators. The CECONY goals and their respective weights, for both the EIP and the MVP plan are:

- Net income (50 percent weight), which is net income including all expenses including all taxes but excluding extraordinary items and the reserve for the award fund. The net-income goal is not weather-normalized.
- O&M budget (20 percent weight), which includes interference and uncollectible expense but excludes benefits, damages, lawsuits, rental fees, and external-audit fees.
- Achievement of performance indicators (30 percent weight).

The following chart shows the 12 performance indicators.

Operating Performance – CECONY			
		Unit of Measure	

The measures of operating performance are unweighted. The achievement of any of the three sets of targets is on a sliding scale of 0-120, which in turn affects the resulting final calculation of the award funds. Each of the three indexes is made up of several measures. The Company also applies scaling-factor calculations for each of three parts. These calculations, which affect the size of the annual award funds, are:

Scaling for Net Income

Performance Relative to Target (%)	Payout Relative to Target (%)

Scaling for Financial Performance (CECONY O&M)

Performance Relative to Target (%)	Payout Relative to Target (%)

CECONY Operating Scaling

Indicators Achieved	Payout (%)

If CEI pays no dividend in a year or if CECONY's net income is less than 90 percent of the target amount there are no annual bonuses unless the board decides otherwise.

iii. Tying stock-based incentive pay to long-term performance

The LTIP provides the structure for granting restricted stock to management employees, who do not own the stock when it is granted. Instead, the restriction is lifted when employees earn vesting rights in the stock, after a three-year performance period, and to the extent performance merits vesting. Half of the vesting for officers is earned as a function of CEI's relative performance, compared to a peer group of utilities, in the measure of total shareholder return (TSR—change in price of stock, plus dividends) over the three-year period. The other 50 percent is the average level of EIP performance (the target incentive funds); both areas of performance are expressed as percents. The plan for management employees in Bands 3 and 4 is the same as for officers except MVP Plan performance is substituted for EIP performance. Just as with EIP and MVP Plan performance, the payout for relative TSR is subject to scaling in the range of 0-150 percent, as the chart that follows shows:

TSR Scaling for LTIP

Rank of CEI's TSR versus Peer Group (percentile)	Weighting Earned (%)
75 th or greater	150
70 th	140
65 th	130
60 th	120
55 th	110
50 th	100
45 th	85
40 th	70
35 th	55
30 th	40
25 th	25
Below 25 th	0

For employees in bands 1 and 2 (the lowest) the restricted shares are time-vested, only, over each 3-year period; in other words, employees who stay with the company for 3 years automatically earn their shares.

iv. Amounts of pay at risk

The MVP Plan puts varying amounts of pay that is at risk for each band. For band 4 employees, which are those immediately below officers, it is equal to 15 percent of base compensation; for band 3 employees, it is equal to 10 percent of base compensation; and for employees in band levels 2 and below, it is equal to 4.5 percent of base compensation.

The guideline percentages of salary at risk under the EIP are also a function of officer rank: vice presidents have █ percent of salary at risk, senior vice presidents █ percent, the president of CECONY █ percent, and CEI's CEO █ percent.

Grants of restricted stock under the LTIP are recommended by the CEO and approved by the board. In a memorandum of January 2007 CEI's CEO recommended LTIP grants to the management development and compensation committee for █ executives, for which the CEO recommended a grant of a total of █ performance restricted stock units. The range of grants was █ to █ units per officer, and the typical grant was about █ units. He also recommended grants of █ performance restricted stock units for the employees in bands 3 and 4 and █ time-based restricted stock units for employees in bands 1 and 2. Award grants of restricted shares for non-officer employees can be in the range of █ to █ shares, at the discretion of management.

Similarly, in a memorandum sent in January 2008 CEI's CEO recommended the next set of LTIP grants, those for the performance period 2008-2010, to the management development and compensation committee. The memo covered █ executives, for which the CEO recommended a total grant of █ performance restricted stock units. The range of grants was █ to █ units per officer. He also, again, recommended grants of █ performance restricted stock units for the employees in bands 3 and 4 and █ time-based restricted stock units for employees in bands 1 and 2.

That same memorandum recommended the vesting of performance shares that were granted pursuant to the LTIP cycle for plan year 2005. The total original award grant for all executives, including the CEO, was █ shares, and the typical award per officer was █ shares.

v. Composition of the performance indicators

As described before, the size of the total pools available for the two bonus plans, and the degree of half of the vesting for employees who receive grants of performance restricted stock units under the LTIP, are dependent on achieving targets for net income, expense budget, and operational performance.

Performance has cascading importance in allocating the pools among departments: all three sets of measures, plus individual performance, totaled and set at the department level (but not net income), determine each department's share of the total CECONY pool. The departmental allotment is further distributed, again, using performance, until it reaches each managerial employee. This means that performance measures—other than net income—are set at each of the major management levels; *e.g.*, senior officer, vice president, and general manager.

The targets for the company-level key indicators for CECONY (as well as the only or primary basis for the EIP for the Certain Officers) for 2007 changed from 2006 in the following ways:

- █: increased by 11 percent
- █: increased by 2 percent
- █: increase the percentage by 5 percent

- [REDACTED]: 2 of the 8 components were made harder to achieve, 2 were made easier
- [REDACTED]: 2 of the 8 components were made harder to achieve.

Otherwise, no changes were made.

Similarly, the company-level targets for CECONY for 2008 changed from 2007 in the following ways:

- [REDACTED]: increased by 5 percent
- [REDACTED]: increased by 19 percent
- [REDACTED]: made harder to achieve
- [REDACTED]: 1 of the 8 components was made harder to achieve
- [REDACTED]: all of the 8 components were made harder to achieve.

Individual attainment of objectives is recorded on a form that is not named but is called Performance Scale at the top. It displays, for each set of performance goals ([REDACTED]), the target and other columns as needed to judge whether performance has been met. The form provides the vehicle for recording expectations and then the outcomes, including calculation of payout achievement.

For the operational-performance indicators the forms are not fixed in format or content, nor could they be because different kinds of measures and jobs require different displays. The forms do, however, all show the weight assigned in advance to each key indicator.

Liberty surveyed the forms collected by the human resources department for CECONY management employees for the years 2006 and 2007, about 200 for each year, with specific interest in the key indicators for operating performance. A few observations can be made about how the process of using the forms has worked.

There was very large variability in the number of key indicators used and their type. For example, in 2006 one director had 1 key indicator, "[REDACTED]," and because that department's [REDACTED] was met, that director earned 100 percent of both the performance indicators and the [REDACTED] measure. There were some forms that had [REDACTED] operational factors, and one had [REDACTED] key indicators, all with equal weights.

The key indicators do not necessarily track to the categories of the CECONY-level indicators of operational performance. For those employees, supporting CECONY achievement of its operational performance has an indirect effect on their incentive compensation, in the setting of the size of the annual funds and the degree of vesting of the operational portion of the restricted shares.

A few departments in 2006 had a line item key indicator for meeting the [REDACTED] for an organizational unit, but the weights applied to these key indicators were not substantially greater than the weight applied to lines that were arguably worth much less money. There were more key indicators about meeting commitments for [REDACTED] in the 2007 forms, but they were still rare. In the 2007 forms there were fewer with the very high numbers of key indicators. In

both years more often than not there were minimal distinctions in the weights assigned to the key indicators

d. Program results

Once targets are established and approved by the Board, they cannot be changed by the CEO or any of his direct reports. The CEO may make recommendations but the Board has to approve any change. While the incentive-compensation program at CECONY centers on measures and calculations there is considerable provision for the exercising of discretion in distributing awards. Descending through the hierarchy, starting with the board and the CEO, many actors have the power to change the targeted awards and outcomes of the incentive-compensation program. For example, under the LTIP Con Ed's CEO recommends grants of restricted stock for the officers, and then the actual award levels, and the officers recommend grants of restricted stock for the non-officer managerial-employee group. As described before, the officers have performance data that guide them in distributing the annual awards, but otherwise have the ability to move dollars as they see fit, and that continues down the organization to the level of general manager or director. This background helps in understanding some aspects of recent experience in implementation of the plans.

For the 2006 EIP, the CEO recommended to the management development and compensation committee that the EIP award fund not be changed from its total size. He did, however, recommend award percentages that varied from the result derived by formula; *i.e.*, the average award fund result was ■■■ percent but the range of award percentages (not related to the amount of base salary at risk) was ■■ to ■■ percent, although more were in the ■■-percent bracket than any other. The award-fund factor result of ■■■ percent; *i.e.*, less than the target of ■■■ percent, came about because CECONY's net income was below the budget (at ■■ percent of target), the O&M-budget achievement factor was ■■ percent, and operational-performance factor result was ■■■ percent (the only two performance indicators that were missed were the measures of electric reliability, which were not achieved because of the Westchester storm and outage in Long Island City). Many management people of electric operations in 2006 had low annual-incentive percentage awards because few key indicators were met and the departmental O&M budgets were exceeded.

In early 2007 the LTI performance grants of stock made in 2004 were paid out. For the ■■ percent of the awards that depended on performance under the annual plan, the average performance of the 3 years 2004-2006 was ■■■ percent ($(■■■ + ■■■ + ■■■)/3$). CEI's rank in total shareholder return (TSR) for the 3-year period was at the ■■■ percentile. The design of the plan was and is that there was no award for the ■■ percent that depended on TSR if performance was below the ■■■ percentile, and so the award rate was half of ■■■ percent. Similarly, in a memorandum sent in January 2008 CEI's CEO recommended that the management development and compensation committee approve the payout of the 2005 vintage LTIP, which because of TSR performance at the ■■■ percentile yielded ■■ percent of the grant.

CECONY's performance in 2007 resulted in a calculated value of 104 percent for the annual incentive plans. The results at the CECONY level included achieving the net income target at 110 percent, the O&M budget at 80 percent, and operational indicators at 110 percent. CEI's CEO adjusted the results down to 101 because of a retroactive change to a safety indicator from

the year before. Most of the results in 2007 for operational performance were achievement over █ points out of a possible █ points, and there were many managerial employees who achieved at the level of █ out of █ points.

All of the incentive-compensation plans naturally have costs. The charts below show CECONY's recent experience with the cost of the program:

CECONY's Costs of Employees' Stock-Based Incentive-Pay Plans

2008 estimated

	Officers	Management
Restricted stock	█	█
Performance-based restricted stock	█	█
Stock options	█	█
Total	█	█

2007

	Officers	Management
Restricted stock	█	█
Performance-based restricted stock	█	█
Stock options	█	█
Total	█	█

Thousands of dollars

CECONY's Costs of Employees' Annual Incentive-Pay Plans

2008 estimated

	Officers	Management
Management variable pay plan	█	█
Executive incentive plan	█	█
Total	█	█

2007

	Officers	Management
Management variable pay plan	█	█
Executive incentive plan	█	█
Total	█	█

Thousands of dollars

The costs of directors' deferred compensation in 2008 and 2007 were █, respectively. To put the recent total cost of incentive compensation (about █) in context some other numbers provide perspective. Total non-officer management salaries are over █ annually; total O&M expense is about █.

e. Results of analysis of program competitiveness

CEI uses a peer group of 20 utility companies when analyzing the competitiveness of the pay of its executives and members of its board. The companies are large, including some of the largest in the United States, and CEI is about the median company in terms of revenue. The composition of the compensation peer group was approved by the MD&C Committee in 2006.

The MD&C Committee and CEI management have recently sponsored analyses of the compensation that CEI offers to different levels of management personnel. The results of most of the studies relevant to the topic of incentive compensation and performance are discussed above in the section on analytic support used by the MD&C Committee and CEI's compensation function. Three additional studies are discussed here.

In 2006 the stock-based incentive compensation for CEI's CEO was set at the target level of 35,000 restricted stock units and 280,000 stock options. The Compensation Consultant valued that award as worth \$2.7 million, or 270 percent of the CEO's base salary. The Compensation Consultant judged that the award ranked at 73 percent of the market median.

In support of a CECONY electric rate filing the Second Compensation Consultant submitted testimony based on the firm's analysis conducted in 2008 for CECONY of non-officer management compensation using data from 2007. The Second Compensation Consultant used two groups of utility companies to make comparisons with Con Edison, one made up of a subset of CECONY's peer group and another, larger group. The results of the analysis differed little between populations, so the discussion here summarizes the combined conclusions of that study.

First, over 90 percent of the other utilities had variable-pay plans and more than half offered long-term incentive plans. Next, the Second Compensation Consultant found that base salaries for benchmarked (sample) CECONY positions were at about the market median. CECONY dropped below the market medians when the value of incentive compensation was included in pay, and more than 10 percent below the median for base pay plus annual bonus at the target level. The disparity was about the same for base salary plus actual annual bonus. Finally, CECONY's total direct compensation (base salary plus annual variable pay plus long-term incentive pay) was about 25 percent below the market median.

Con Ed did its own survey of 13 large utility companies in 2007, which showed that for non-executive non-represented employees that the percentages of base pay at risk were generally lower than those of the other companies.

5. Compensation of CEI's Outside Board Members

The non-employee members of the board receive cash retainers; the base retainer is now \$50,000 annually. In addition to the base retainer all members receive \$1,500 for every committee meeting (members of the Audit Committee receive a \$2,000 per meeting fee) and every board meeting they attend, the CEI lead director receives an additional retainer of \$20,000 annually, and committee chairs receive additional retainers of \$5,000, \$10,000, or \$20,000, depending on which committee they chair.

The non-employee members annually receive stock as part of their compensation, under CEI's long-term incentive program. The stock that they are granted is given in the form of deferred stock units, which means that the members do not receive shares until they retire, and are the functional equivalent in the sense that they earn dividends on their units. The annual grant to outside members is currently set at 1,500 units, which, assuming a stock price of \$36 per share, is worth about \$54,000.

C. Conclusions

1. The documentation of incentive-compensation plans is comprehensive and current.

Con Ed has complete and up-to-date systems, processes, and documents useful for the legal and administrative aspects of the incentive-compensation program.

2. The board gets the information it needs about the results of the incentive plans to make the decisions and give the approvals that are its obligation.

The MD&C Committee and, by extension, the board receive substantial information from CEI management and its compensation consultant. The MD&C Committee approves significant actions regarding incentive compensation that is tied to performance.

3. The MD&C Committee and CEI's management have sufficient access to the analytic resources needed to assess the competitiveness of pay generally, and incentive compensation specifically.

The consulting firms that are used are among the best-known in the industry. The compensation peer group is made up of companies that are like CEI/CECONY. The MD&C Committee had a considerable number of reports from its consultant on a variety of compensation topics in the last two years.

4. The design of Con Ed's bonus plans give management employees varying incentives to work towards achieving goals that are important to the company.

The MVP Plan and the EIP, with the notable exception of the certain officers, have the standard elements of a bonus program; *i.e.*, objective financial and operational goals as well as evaluation of personal performance.

The use of CECONY-level performance measures (CEI net income, O&M budget, and the operational indicators) to set the size of the annual incentive funds and half the vesting of the restricted stock should act to focus the attention of almost all levels of management on attainment of those measures.

In addition, as discussed in the section in this chapter on corporate goals and performance management, there is a system that provides visible, updated information on progress or problems meeting performance indicators. While there are deficiencies in the reporting system for performance indicators, as described in the previous section, the monthly reporting of actual results at both the company and business-unit levels, with calculations of resulting payouts through that period, is an important practice. Because bonuses cannot be paid until after the year is done, the reporting is providing the next best thing—a fresh reminder of how one is doing towards reaping the reward in the future.

5. Con Ed's use of stock-based compensation for management personnel and outside board members comports with industry practice.

Con Ed's use of a long-term incentive program for management and board members is structured like that of other utilities like Con Ed. Moreover, the manner in which Con Ed uses stock as a part of that program is like that used by other large utilities, and it makes sense to use stock as a

piece of compensation packages because that does reward or penalize participants, along with stockholders.

6. The long-term incentive program is designed to reward performance.

The vesting of half the value of performance restricted shares is tied to stock-market performance compared to peer companies. Because the performance of CEI's stock price during the period 2004-2006 was near the bottom of the group of utility companies against whom it compares itself, employees who were eligible to receive performance-based restricted stock only received 44 percent of the target amount of the award for the plan year 2004. Thus, the plan did act to align the remuneration of management, and especially executives, with stockholders.

7. The design of the annual bonus plan is complicated and over-emphasizes meeting CECONY's O&M budget at the expense of other, important measures.
(Recommendations 1 and 2)

CEI's incentive-compensation program is comprehensive, ties incentive pay to the achievement of objective performance measures, and reflects effort and thought in planning and administration. That does not mean, however, that it is not without flaws.

The biggest problem is the large combined weighting on the goals for net income and O&M budget. The defect is that the two are highly correlated, especially in the sense that the largest controllable factor contributing to the achievement of net income is O&M expense.

The effect of the problem is multiplied because of the ubiquity of the two measures in the incentive-compensation program. That phenomenon is amplified at the top of the management pyramid because of the structure of the EIP for the certain officers and its reliance only on the quantitative measures (see also the next conclusion).

The narrow basis for determining awards because of the repetition of the two income-statement factors precludes balancing with other measures of company performance and goals with which compensation should be tied. The most obvious is that staying within the capital budget—which is much larger than the O&M budget—has no weight at all. (In addition, for much electric-utility work the difference between capital and O&M expense is not great and thus there is room for gaming the system to meet targets.) Any other long-term goals are also excluded by default. Further, in some organizational units the O&M budget is not important, like small staff groups or those whose job is construction.

Next, there is no direct measure that holds managers accountable for completing work programs. Thus, it is possible to stay within budget by not getting the budgeted work done, and still earn points towards a bonus payment.

It is appealing to not have mandated numbers and types of operational performance indicators for group and individual performance. On the other hand, Liberty's review showed that the oversight of the number and kind of performance measures is not uniform. For some managers there are so many performance indicators, and concomitant low weights, that it is likely that the benefit of using performance indicators—focusing attention on what is important—is diffuse.

To take one example, the nine particular operational indicators of CECONY's senior vice president of customer operations are all relevant to that function, although the safety index measure is less direct than the others. The weighting accorded to 7 of the measures is 3 percent, and 2 are given a weight of 2 percent. As with Liberty's broader observations, though, the measures include nothing about adherence to the capital budget at either the business-unit or function level, or about completing a work program, or productivity. In addition, the lack of differentiation in the importance of the measures is typical and is hard to accept: it is unlikely that virtually all of the measures are equally important. It is likely, though, that someone knowledgeable about the function could rank order the measures, and it would then be logical to, at least, say that the most important measure is twice as important as the least, and the weightings should follow.

The lack of written performance reviews for officers is an unusual practice. Given that the annual bonuses and performance-stock awards are subject to the discretion of the board and CEO, and that discretion would be exercised at least in part on the factors that would show up in a written, personal performance review, it is better to document the reasons for decisions than not.

Finally, the method used for determining the size of the annual funds for distribution adds complexity when simplicity would be desirable. Support for this comes in considering the amount of documentation needed to explain how this is done. While not always possible, the causes and effects in incentive compensation should be straightforward.

8. The structure of the long-term incentive program re-emphasizes Con Ed's over-focus on meeting the expense budget. (Recommendation 2)

Beyond the points made above, CEI's consultant, the Compensation Consultant found, and Liberty's experience confirms, that large utilities use TSR as the measure for stock-based incentive compensation. While CEI employees were penalized by this measure during the go-go years for utility stocks, especially because of the short run of success of some companies' non-regulated businesses, the opposite effect is occurring now. In any event, using a peer group of companies that are most like CEI is extra important to ensure that the right index causes compensation outcomes.

9. Neither the annual cash bonus nor long-term incentive plans put enough compensation at risk or have enough stretch. (Recommendation 1)

The amounts (percentages) of salaries of non-executive management (non-bargaining unit) employees that are at risk in variable pay (annual incentive, or bonus, and stock-based long-term incentive) are too low. They look low in absolute terms; *i.e.*, especially observing the increasing levels of responsibility of employees whose annual bonus opportunity is small, *e.g.*, a target of 15 percent of base for management people with substantial responsibility. The cash-bonus opportunity for the lowest level of management employees is so small as to be inconsequential, especially after consideration of payroll and income taxes, which at the margin for CEI employees are likely to be over 45 percent. Because taking that bonus away is infeasible, it should either be changed to fixed pay or over time increased by decreasing merit increases, for instance. This observation is buttressed by the work that the Second Compensation Consultant performed for Con Ed.

In addition, on the subject of executive compensation the Compensation Consultant in April 2008 reported that “Con Ed’s annual incentive plan is less leveraged above target and has a lower performance threshold than peers.” the Compensation Consultant said: CEI “should consider refining the leverage curves of both the annual and long-term plans to better align the pay/performance relationship relative to the peer group” and “Con Ed’s performance equity plan is less leveraged above target and has a lower performance hurdle than the peer group.” the Compensation Consultant’s charts are shown next:

Study Results on LTI

Annual Incentive Peer-Group Median		
Performance (%)	Achievement	Payout (%)

CEI		
Performance (%)	Achievement	Payout (%)

Long-Term Incentive Peer-Group Median		
Performance (percentile)	Achievement	Payout (%)

CEI		
Performance (percentile)	Achievement	Payout (%)

While the incentive opportunities are not as large as the relevant market, the risk in not getting a payout is low. An effective incentive should provide a risk distribution for success and failure that is reasonably symmetric, and should create an expectation that performance will improve over time.

10. The bonus and long-term incentive plans both allow for much exercise of the board’s and management judgment. (Recommendation 1)

While both plans have involved mechanics they also provide for unfettered intervention in overriding the mechanical outcomes of calculations. The calculations of achievement of performance targets can be regarded as sources of guidance for the decisions made in granting of annual bonuses. This means that there is always uncertainty for the recipient, and the chance for disappointment or the opposite reaction. At the same time, the flexibility can be used to prevent what superiors might feel is unfair reward or penalty. Even though the vesting of shares under the LTIP is a function of straightforward calculations 3 years after a grant (subject to the approval of the board), the initial grant amount is up to the responsible superior.

D. Recommendations

1. Increase the amount of stretch and put more pay at risk as part of a broad revamping of incentive compensation. (Conclusions 7, 9, and 10)

Con Ed should undertake a significant project of study of its incentive-compensation program with the objective of making changes that will support achievement of important goals. This means considering simplifying the plans (*e.g.*, eliminating the use of the award funds), and the value of the high levels of discretion that can be exercised in the annual and long-term plans, with the aim of using other controls to bound financial exposure but increase certainty and symmetry.

The incentive program costs a lot in absolute terms but not much in relative terms. Matching the cost of the program with its value can't be done—it is a best-efforts bet, at best, which is all that can be done, and Con Ed can point to its experience in meeting budgets, net-income, and operational performance targets. All of this points to the conclusion that it is worth the investment to take advantage of the work already done and improve the program.

2. Before the study is done and implemented, reduce the emphasis on O&M expense and increase the weighting for capital expenditure performance and the operating performance measures. (Conclusions 7 and 8)

While these changes do not have quantifiable costs and benefits, at the very least the difference in size between the O&M and capital budgets merits making this change.

VI. Performance Measures

CECONY identifies its Key Performance indicator system (KPI) as its performance measurement system. The KPI system was created in 2006 from a previous system of performance indicators, with the primary purpose of administering the Company's management variable pay compensation program. For the most part, it is short-term oriented. The system is available on CECONY's Intranet to all management-level employees, and they appear to pay close attention to it.

However, the KPI system does not comprise a robust management information system. CECONY does not have a comprehensive, corporate-wide integrated system of performance measurement. Business unit managers have their own sets of performance indicators to manage their units, which are typically combinations of reports put together to suit the needs of the managers. Generally, the Company has sufficient data and information for all of its operations and activities. As with planning, that data and information is disaggregated throughout the operating units and not assembled and compiled into a coherent, integrated system.

A. Background

There are many approaches to measuring performance, but ultimately the basic criteria are the same. Performance measurement data and information should be:

- Timely
- Accurate
- Designed to measure the material contributors to achieving specific corporate and unit goals and objectives
- Stratified and geared to the level in the organization to which presented; e.g., more broad and general at the top, more focused and specific at the bottom
- Consistent in presentation
- Consistent in metrics used across the enterprise to the extent reasonable and possible
- Subject to consistent data sets
- Packaged and presented in a user-friendly manner.

Performance results can then be used to compare relative to past performance, to projected and budgeted performance, to internal and external benchmarks, and to peer entities. Those comparisons can then be used to drive corrective actions, goals, objectives, future performance.

The criteria by which Liberty evaluated performance measures included the following:

- Policies, Procedures and Practices
 - There should be an established methodology and process for collecting, compiling and reporting results.
 - There should be a dedication of specific resources, supported by sufficient automated systems, to assuring that all data necessary for addressing established metrics is: (a) collected, (b) verified, (c) aggregated by appropriate class, (d) stratified for use by ascending levels of supervision and management, (e) reported meaningfully, (f) analyzed for trends and concerns, and (g) used as a basis for identifying improvements in efficiency and effectiveness.

- The methodology and process for accomplishing #1 above should be reviewed periodically.
- Job descriptions should relate to applicable metrics.
- Individuals job understandings should relate to applicable metrics.
- Metrics Used
 - There should be a clear process for establishing and revisiting the performance metrics used, in order to assure that they address all material attributes of service effectiveness and efficiency including such items as overall system reliability, reliability of local areas, and loss reduction.
 - These metrics should correspond to specific, measurable goals and objectives at the detailed (lower) levels of the organization, at which day-to-day responsibility for conducting activities lies; they should bear a close relationship to the discrete activities necessary for accomplishing detailed goals and service-affecting processes.
- Reporting Process and Reports
 - Collection and compilation of results data should be accurate and timely.
 - Feedback and distribution of results should be accurate and timely.
 - Feedback and distribution of results should be in a format and level of detail targeted to the intended recipients.
 - Reports should be stratified for review at different levels of the company.
- Use of Results
 - Senior management should give significant, recurring emphasis to the need for performance accountability that is determined through comprehensive and, wherever practicable, measurement of performance against clearly established cost and quality benchmarks.
 - How are mid-course corrections instigated, and by whom?
 - How are long term changes instigated, and by whom?
- Benchmarking
 - Such information should be benchmarked internally (e.g., trends over time, differences among regions) and externally through the use of comprehensive, current industry information.
- Use of Outside Assistance
 - Has the company retained outside expertise to evaluate its use of performance metrics?
 - Has the company retained outside expertise to evaluate its performance relative to peers or peer groups?

B. Findings

CECONY states that it uses a number of tools to look at its performance, including:

- The Key Performance Indicators (KPI) system
- Specific parameters and reports
- Benchmarking studies
- Comparisons with others
- Memberships in industry groups.

Each of these activities is discussed in further detail below.

1. The Key Performance Indicators (KPI) System

CECONY considers the KPI system to be its primary performance monitoring tool and its primary set of performance indicators. The KPI system was instituted in 2006 and utilized for the first time in 2007, in order to support awards under the company's Management Variable Pay program, which is the variable portion of the management compensation program applying to all management level employees. The only significant change to the corporate KPI categories since adoption has been the inclusion in 2008 of a safety KPI, which will apply in determining 2009 payouts.

The KPI system provides a set of hierarchical performance goals for all management levels, from the corporate down to general manager department level. At the corporate level, the KPI system includes goals for the following categories in 2008:

- Adjusted Net Income for Common Stock
- O&M (the Operating Budget)
- Operating Performance.

Operating Performance consists of 12 categories:

- Electric
 - Electric Non-network System Availability
 - Electric Network system Availability
- Gas
 - Respond to Gas Odor Complaints within 30 Minutes
 - Workable Gas Leak Year End Backlog
- Steam
 - Steam System – Normal Pressure Operations
 - Generation Stations – Forced Outages
- Customers
 - Representative Calls answered within 30 seconds
 - PSC Complaints
 - Customer Satisfaction Surveys (composite of 4 components)
- Safety Index (composite of 8 components)
- Environmental Index (composite of 8 components)
- Employee Development Index (composite of 8 components)

Exhibit VI.1, following this chapter, provides descriptions of each of these categories, including the components of the Customer Satisfaction Surveys and the Safety, Environmental and Employee Development Indices.

Implementing the KPI system did not bring to CECONY an entirely new set of metrics, but rather a modification and enhancement of the existing performance indicator system. Many of the indicators already existing did not change, some were added, some were deleted, and others previously kept at the business unit level became aggregated at the corporate level. The major

change brought by the adoption of the new KPI system was to create a direct linkage between management incentive compensation and the revised indicators.

The next table shows a comparison of the 12 CECONY operating performance indicators (PIs), which evolved into KPIs, year by year from 2003 through 2008. KPIs indicated on the table were developed in the year indicated, to be applied to management compensation in the following year. Full definitions and descriptions of the KPIs and the target levels for 2008 are included in the Exhibit VI.1.

Performance Indicators and KPIs 2003 – 2008

Operating Performance Measure	2003	2004	2005	2006	2007	2008
Electric						
Electric Non-Network System Availability	PI	PI	PI	KPI	KPI	KPI
Electric Network System Availability	PI	PI	PI	KPI	KPI	KPI
Gas						
Respond to Gas Odor Complaints within 30 Min.	PI	PI	PI	KPI	KPI	KPI
Workable Gas Leak Year End Backlog	PI	PI	PI	KPI	KPI	KPI
Steam						
Steam System – Normal Pressure Operations	PI	PI	PI	KPI	KPI	KPI
Generation Stations – Forced Outages	PI	PI	PI	KPI	KPI	KPI
Customers						
Representative Calls answered within 30 Sec.*	PI	PI	PI	KPI	KPI	KPI
PSC Complaints	PI	PI	PI	KPI	KPI	KPI
Customer Satisfaction Surveys (4 components)	PI	PI	PI	KPI	KPI	KPI
Safety						
Safety Index (8 components)	PI	PI	PI	PI	PI	KPI
Environmental						
Environmental Index (8 components)	PI	PI	PI	KPI	KPI	KPI
Employees						
Employee Development Index (8 components)			PI	KPI	KPI	KPI

* Years 2003 – 05 did not include 30-second response time

Moving from corporate level to the lower management levels, KPIs become increasingly more specific to the task of the individual employees. Overall, CECONY has some 2,550 individual KPIs for its management employees.

CECONY maintains the KPIs on an Intranet-based program known as the CECONY Performance Indicators (CPI) “dashboard.” All management employees have read-only dashboard access to all the corporate level indicators, including their own KPIs, and their subordinates’ KPIs. The highest level dashboard screen includes the indicators from the preceding table and the status of the Net Income and O&M Budget indicators. Exhibit VI.2 illustrates this screen.

CECONY's departments have "delegates," who have authority to input their department data into the CPI database on a monthly basis, and to make any other authorized changes. Several "monitors" have overall responsibility for ensuring data accuracy, timeliness, and coordination. Each KPI has a rule governing its status. The delegates enter in the raw data; the software aggregates that data, weights it, and applies the established criteria to produce the final results in the classifications shown on the dashboard.

Each year's planning cycle includes a KPI review to determine if any should be modified for the coming year. The board¹ reviews corporate KPIs at its January meeting.

2. Other Performance Measurement Activities

a. Internal Reports

CECONY maintains a number of periodic reports and generates ad hoc reports as necessary. Those reports generally fall into the following categories:

- Operations
- Financial/budgets
- Staffing
- Regulatory Requirements.

b. Benchmarking Studies

CECONY has participated in meetings with a number of interutility committees and working groups, including:

- The Overhead Standards Committee
- The URD (Underground Residential Distribution) Operations Committee
- The Underground Cable & Splice Committee.

c. Comparisons with Others

CECONY has performed the following comparisons or engaged in the following interactions with other utilities:

- Compensation, with a peer group of 20 integrated utilities
- Visited and met with utilities from a number of other major cities in the United States and abroad, including London, Paris, Hong Kong, Shanghai, Osaka, Tokyo, Sidney, Singapore, Chicago, Philadelphia and Berlin
- Sent some of its engineers and managers to other utilities and hosted engineers from European and Asian utilities
- Participated with a PSE&G Peer Panel this year; has not done so in the past.

¹ See chapter IV for a discussion of the common structure and operation of the CEI and CECONY boards.

CECONY has received reports comparing it with a number of other utilities, including the following:

- The PSC's annual report on *Gas Safety Performance Measures*
- PA Consulting's Reliability Surveys addressing T&D operations and reliability.

d. Memberships in Industry Groups

CECONY participates in a number of industry groups, including:

- The International District Energy Association
- The American Gas Association
- The Edison Electric Institute (EEI)
- The Electric Power Research Institute (EPRI).

C. Conclusions

1. The KPI system continues what has been a fairly consistent set of performance measurements over recent history.

The KPI system was developed in 2006 based on existing performance measures. Liberty understands that in part, the impetus for the change was to extend performance measures to the non-operating side of the house, where discreet performance measures were not used.

Liberty reviewed the operating performance measures for the years 2002 through 2008 and the transition from performance measures to KPIs. For the most part, the performance measures utilized were consistent over that period, with the exception of the addition of the safety index added in 2008. The point of departure from the previous system was the development of the formulas that converted the performance measures into indices used for determining variable compensation. On the one hand, this made the variable compensation portion totally formula based; on the other hand, it lost some level of detail in the ability to see the performance measures without drilling down into the lower level data.

2. The KPI system platform has limited functionality. (*Recommendation 1*)

The KPI system is operated on the Company's intranet, with the underlying data processing performed on a legacy mainframe computer system. Data is provided on a monthly basis from the various CECONY organizations, and is then entered into the KPI system. To the extent that potential anomalies or errors may exist, they must be identified by an individual scanning the data.

The KPI system is essentially a month-at-a-time viewing system. It does not have the capability to create and display graphs, trends, cumulative results or to allow robust analysis. An individual sitting at a computer screen does not have the ability to call up, for example, Electric Non-Network Availability for the last 12 months and to manipulate that data. The system does allow for the generation of reports, but they must be manually developed under a cumbersome and time consuming process. Managers do not use it to manage their departments; they use their own data and reports, which provide the sources from which the KPI data is manually extracted.

In sum, the KPI system is an add-on system with limited functionality, not integrated into a corporate management information system, but geared specifically toward the Management Variable Pay program.

3. Managers pay close attention to the KPI system and to their KPIs.

Liberty observed that CECONY managers, at every level in the organization, were familiar with the KPIs that affected them. The KPIs were cited time after time as the activities managers focused on and the measures of performance. In and of itself, this is neither good nor bad, but proves that *when you have them by the paycheck, their hearts and minds will follow.*

4. CECONY does not have a comprehensive, corporate-wide integrated system of performance measurement. (Recommendation 1)

The major function of the KPI system is management compensation, not operating performance measurement system. The KPI system has a number of limitations as a performance measurement system:

- The performance indicators used in the KPI system are almost exclusively short term oriented.
- The corporate level performance indicators (SVP and VP level) used in the KPI system are inconsistent across business units and departments.
- The system does not have robust analytical capability; *e.g.*, trending, graphing, comparisons, historical analysis, ability to drill down.
- Many of the indicators the SVPs/VPs use to manage their operations are not reflected in the KPI system.

For the most part, the KPIs are based upon current year or shorter term parameters. The corporate indicators are based on three primary areas enumerated earlier, Net Income, O&M budgets, and the 12 operating indicators. The business unit level KPIs (Senior VP or VP level) KPIs for 2008 are shown in the following table.

Business Unit KPIs	
Business Unit	Key Performance Indicators
Electric Operations	Safety/Environmental Index
	SAIFI Network
	SAIFI Non-Network
	CAIDI Network
	CAIDI Non-Network
	Customer Satisfaction Surveys - Electric Emergency Calls
	Feeder Restoration Times
	Reliability Programs Tied to Performance Mechanism
	OSHA Incidence Rate
	Significant High-Hazard Injuries
	Public Safety-Related Equipment Failures
	Preventable Vehicle Collisions
	System Safety - Operating Errors

	Safety Strategy/Work Practice Improvements
	Documented Field Inspections & Safety Observations
	Late Spill Notifications
Central Operations	Safety Index
	Environmental Performance Index
	Regulatory Mandated Programs Index
	Station Shutdown
	NERC/NPCC Violations
	Production Forced Outages
	Project Work Completed on Schedule
	Steam Operation within Normal Pressure
	Equipment Reliability Index
	Feeder Restoration
Gas Operations	Respond to Gas Odor Complaints within 30 Minutes
	Workable Gas Leak Year End Backlog
	Safety Index
	Environmental Index
	Specs, Procedures, Drawings in Compliance; Revise Standards
	Year End Leak Backlog
	Customer Satisfaction Surveys - Gas Emergency Calls
	Damage Prevention
	Gas Main Replacement
	Minimize Customer Outage Time
Steam Operations	Steam System – Normal Pressure Operations
	Safety Performance Index
	Environmental Performance Index
	Steam leak backlog (average 12 months)
	Capital Budget – within Target
	Project Work Completed on Schedule
	Regulatory Commitment Index
	Stack Days (average 12 months)
	Pure Base Revenue
	Generation Stations – Forced Outages

With very few exceptions, the corporate level and business unit level KPIs indicate, at a gross level, how CECONY is performing relative to key short term goals and objectives. The indicators are essentially year-to-date measurements; there are no long-term measurements.

CECONY participates to some degree in a variety of activities in the electric, gas and steam industries, including benchmarking studies, participation in industry groups, and comparisons with other utilities. The effectiveness of that participation is discussed elsewhere in this report.

Those activities do not comprise a performance measurement or management information system and, except in instances where there are mandated external standards (e.g., PSC or DOT), for the most part they do not provide benchmarks or standards by which CECONY evaluates its performance. They are isolated activities, narrow in scope and reach, and not incorporated into any larger system of measurement.

5. Business unit managers use their own sets of performance indicators to manage their operations. (Recommendation 1)

The lack of a corporate-wide system of performance measurement does not mean that the business unit managers do not track the performance of their respective units. Rather, similarly to the way the Company approaches business planning, each business unit goes its own way. As with planning, CECONY has not established a fully effective balance between centralized and decentralized control. It is appropriate that top level management not establish unilaterally the specific parameters to be measured; nevertheless, the appropriate levels of operating performance, and how those levels are to be achieved, some level of standardized reporting, the types of parameters to be reported, and the format of the reporting is appropriate.

Liberty developed a set of generic operating performance measures, based on experience as well as CECONY's measures that should be reasonably expected from the gas, electric, and steam operations and compared that list to measures actually tracked by the respective business units. The results are presented in the tables below, together with an indication of whether CECONY tracks and monitors those measures.

Generic Electric Operations Performance Measures

Performance Measure	Tracked	Comments
SAIFI & CAIDI indices – non-network and network	✓	Network indices are almost meaningless, but still necessary to track
MAIFI	✓	Momentary Interruptions
Safety indices	✓	
No. of internal transformer failures	✓	
No. of UG structure events	✓	
No. of electric shock incidents	✓	
Percent of feeder auto opens	No	
Feeder restoration durations – summer	✓	
Feeder restoration durations – non-summer	No	
Number of Network shutdowns	✓	
Number of Network widespread low voltage incidents (partial shutdowns)	No	
Average year end jeopardy ranking of more failure-prone networks	No	Current ranking system includes all networks; almost meaningless
Capital budgets within at the Vice-President level	✓	
Improvement and reinforcement budgets within at Vice-President level	No	
Improvement and reinforcement programs and projects >\$1M within budget at Vice-President level	No	
O&M costs	✓	
Capital costs	✓	
O&M costs per account/per mile	No	

VI. Performance Measures

Capital costs per account/per mile	No	
% of annual primary cable replacement	No	

Generic Central Operations Performance Measures

Performance Measure	Tracked	Comments
No. of station shutdowns	✓	
Safety indices	✓	
Estimating indices	✓	
Environmental indices	✓	
Equipment reliability indices	✓	
Project schedule indices	✓	
Feeder restoration durations – summer	✓	
Feeder restoration durations – non-summer	No	
Percent of Purchase Order Change Requests (POCR) for projects >\$10M	✓	On fixed price projects, excluding remediation projects, > \$150,000
Percent of Purchase Order Change Requests (POCR) for projects <\$10M	✓	On fixed price projects, excluding remediation projects, > \$150,000
Capital budgets within at Vice-President level	✓	
New substation budgets within	✓	
Percent of Individual project and programs budgets >\$1M that are within budget	✓	
O&M costs per customer	No	
New substation costs per MVA of planned capacity – excluding land, transmission & site abatement	No	
New substation costs per MVA of actual capacity – excluding land, transmission & site abatement	No	

Generic Gas Operations Performance Measures

Performance Measure	Tracked	Comments
Leaks per mile of main and per 1000 services	✓	Total and by area; PSC Mandated
Time to respond to odor complaint	✓	PSC Mandated
O&M costs	✓	
Capital costs	✓	
O&M costs per customer	No	To some extent
Capital costs per customer	No	To some extent
Manpower utilization rates	✓	PSC Mandated
Manpower effectiveness	✓	Total, not by area
No. of workable leaks at year end	✓	Total and by area
No. of safety-related incidents per year, by area	✓	Total and by area
Miles of cast iron replaced per year	✓	Total and by area
Miles of bare steel replaced by year	✓	Total and by area
Cost per foot of main replacement by area	✓	PSC Mandated
Cost per foot of new main by area	✓	Con Ed only; excl. contractors

Leak repairs per year by area	✓	
Man-hours worked without lost time or accident	✓	

Generic Steam Operations Performance Measures

Generic Performance Measures - Steam	Tracked	Comments
Leak backlog (awaiting or under repairs)	✓	
Leaking slip joints per mile of main	✓	
No. of leaks under investigation	✓	
No. of vent stacks	✓	
No. of stack days	✓	
No. of steam vapor sources during heavy rains	✓	
No. of leaking steam traps per mile	✓	
No. of defective steam traps per mile	✓	
Time to respond to leak or complaint	✓	
No. of inspections exceeding required time	✓	
No. of manholes more than 25% uninsulated	✓	
No. and profiles of flanges repaired multiple times	✓	
No. of manholes needing rebuild	✓	
No. of tunnels needing rebuild	✓	
No. of remaining higher risk expansion joints	✓	Internally pressurized joints
No. of injuries requiring medical treatment	✓	For contractors, not employees
No. of system low pressure hours	✓	Less than 125 psi
Available steam reserve margin	✓	Reported daily
O&M costs per account	✓	
Capital costs per account	✓	

These tables indicate that generally, CECONY measures and compiles the data appropriate for operating and managing its system. In virtually every case where the data is not tracked and monitored, the raw data is available but is not necessarily analyzed and tracked according to the performance measure indicated. Put simply, somewhere in the Company, the data exists.

6. CECONY's corporate performance indicators place insufficient emphasis on longer term performance. (Recommendation 1)

While Liberty has concluded that the KPI system is a compensation system, and not a comprehensive management information system, it is nonetheless the system CECONY uses as its management information system at the corporate level. A review of the corporate KPIs and the operating senior vice president KPIs contains little to no reference to capital budgets, infrastructure replacement, or long-term goals. The corporate level KPIs (see Exhibit VI.1) have no such references, and the business unit KPIs have minor references (*e.g.*, project work completed on schedule in Central Operations and Gas Main Replacement in Gas Operations). Bearing in mind that the KPI system is the incentive compensation system for management, this conclusion leads inevitably to the corollary that management is rewarded or penalized almost exclusively based upon the short-term view.

7. CECONY's limited, general comparisons with other utilities may be comforting but provide little useful information. (Recommendation 1)

CECONY does compare itself to other utilities using some indicators, such as SAIDI and CAIFI. CECONY always comes out as a top performer in this category. However, CECONY also emphasizes that it has a network distribution system for most of its service territory, which very few other utilities in the world have, and none to the extent CECONY does.

Thus, that comparison is of little use. It is somewhat analogous to comparing the speed of a jet plane with propeller planes and concluding that the jet performs in the top percentile – a foregone conclusion but providing little insight. A more refined set of external benchmarks is required for such comparisons to be meaningful.

D. Recommendations

1. Develop a corporate-wide management information system. (Conclusions 2, 4, 5, 6, 7)

A multi-billion dollar enterprise in a relatively stable business that is in that business for the long haul needs a comprehensive, integrated, management information system on a computer platform somewhat close to state-of-the-art. Developing and implementing such a system requires the right balance between top-down direction and bottom-up development. Further, determining the costs of such a system is relatively straightforward, while quantifying the benefits is a difficult task. Similar to the task of quantifying the benefits of good management as compared to mediocre or poor management, it will involve cost components within an estimated range, as opposed to hard numbers, and will place substantial reliance on qualitative aspects. Researching the platforms available, developing the concept and performing a cost/benefit analysis may be an appropriate task for an interdisciplinary task force.

A general outline for such a project might include:

- Researching available platforms
- Reviewing systems of a sample of utilities and business enterprises
- Researching the pitfalls that may be associated with such an endeavor
- Specifying the attributes of the system, including analytical capabilities
- Performing a cost/benefit analysis as project development proceeds, in order to assure that system features with substantial cost will produce tangible benefits
- Developing a set of corporate guidelines and requirements, including what parameters must be standardized and what may be customized across business units
- Developing a phased approach.

Given the multiplicity of disaggregated platforms and systems in the various business units, this effort should start with a blank slate. Further, for the most part it should probably not attempt to capture all historic data, but rather be primarily directed on a going-forward basis, with historic data included only for critical parameters.

Ultimately, the KPI system should be included in this effort, so as to enhance its capabilities and to avoid multiple databases.

Exhibit VI.1: 2008 Corporate Level Key Performance Indicators

2008 Performance Indicator Descriptions		
Number	Indicator	Target
Adjusted Net Income for Common Stock		
	Adjusted CON EDISON Net Income for Common Stock shall mean Net Income from Ongoing Operations for CON EDISON, which includes income from CON EDISON operations after subtracting all expenses incurred by CON EDISON, including federal and state income taxes. Adjusted CON EDISON Net Income for Common Stock shall not include extraordinary non-recurring items identified by the Company after the target is established. Examples of items that would not be included are the Indian Point 2 Settlement and the Electric, Gas, and Steam Rate Plan changes. Adjusted CON EDISON Net Income for Common Stock shall be net of the reserve established for the Award Fund at the year-end closing and shall not be weather normalized. Note: The Company does not publish projected net income.	
O&M (Operating Budget)		
	Operating Budget (OB) shall mean the portion of the CON EDISON O&M Budget approved by the Board of Trustees that is comprised of departmental expenses. OB shall include "Interference" and "Uncollectible" expenses. The OB would not include corporate expenses such as employee benefits, damages, and lawsuits, rental fees (transformer vault rental) and external audit fees.	
Operating Performance		
ELECTRIC		
1	Electric Non-Network System Availability These Availability Indices for Electric Ops are calculated as the percentage of time during the year that service was available to customers. The indices are calculated as 1 minus (total customer-hours of interruption during the year divided by the total customer hours requiring service.) The data excludes PSC excludable storms. The Availability metrics measures the performance on our primary mission of providing Electric Service. The measurement shows the percentage of time throughout the year for which the Company successfully achieved this goal.	$\geq 99.99\%$ Percentage
2	Electric Network System Availability These Availability Indices for Electric Ops are calculated as the percentage of time during the year that service was available to customers. The indices are calculated as 1 minus (total customer-hours of interruption during the year divided by the total customer hours requiring service.) The data excludes PSC excludable storms. The Availability metrics measures the performance on our primary mission of providing Electric Service. The measurement shows the percentage of time throughout the year for which the Company successfully achieved this goal.	$\geq 99.999\%$ Percentage
CUSTOMERS		
3	Representative Calls (Answered within 30 seconds) Percentage of calls answered by our Call Centers between the hours of 9:00 AM and 5:00 PM Monday through Friday, (excluding holidays). The percentage includes only calls answered by customer service representatives within 30 seconds.	$\geq 56\%$ Percentage
4	PSC Complaints Tracking complaints made to the Public Service Commission allows us to measure (per 100,000 customers) how many of them go to the PSC in order to resolve their problem.	≤ 2.6 Per 100,000 Customers
5	Customer Satisfaction Surveys Customer Satisfaction Surveys are conducted twice each year during the second and fourth quarters. These are telephone interviews of customers who contact us. The surveys are conducted by a vendor.	≥ 80.0
5a	Electric Emergency Calls This indicator represents the customers' rating of how we handled an electric emergency from the point of contact in the Call Center to the field repair.	≥ 80.0 Number
5b	Gas Emergency Calls This indicator represents the customers' rating of how we handled a gas emergency from the point of contact in the Call Center to the field repair.	≥ 88.1 Number
5c	Non Emergency Calls This indicator represents the customers' rating of how we handled a call related to billing, credit or establishing service.	≥ 82.0 Number
5d	Visitors This indicator represents the customers' rating of how we handled their inquiry when they visited one of our Walk-in or Customer Service Centers.	≥ 83.0 Number

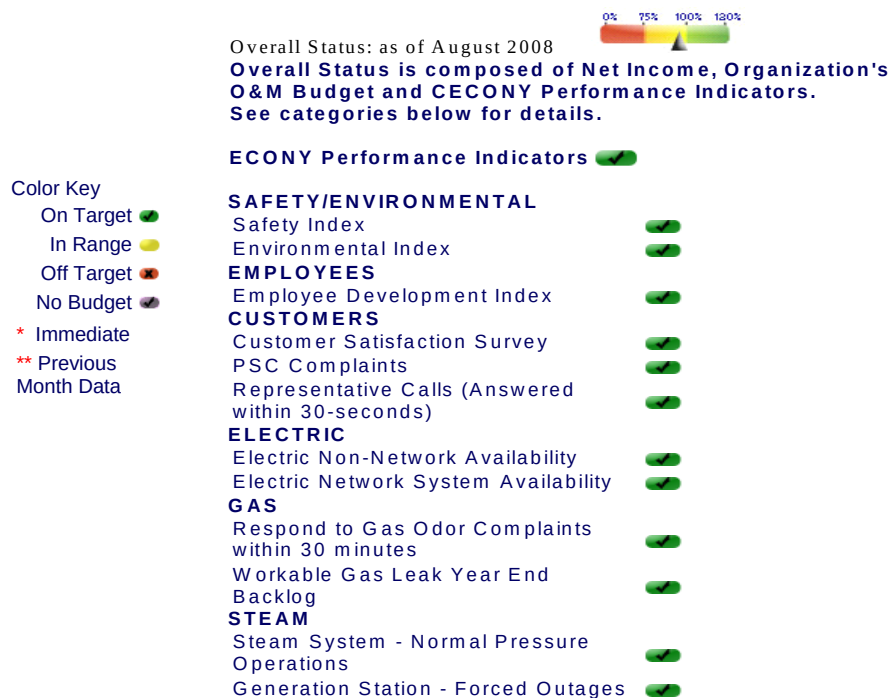
GAS		
6	Respond to Gas Odor Complaints Within 30 Minutes Response time is measured from the time the call is received to the time of arrival of qualified company personnel at location. Included in the calculation of this performance indicator are instances where the company responds to a report of gas odor or other unidentified odor, and investigation determines the problem is due to something other than natural gas. Immediate or "zero" response times for gas odors or leaks that are discovered by company personnel during normal operations and maintenance activities are excluded from this performance indicator except in cases where qualified company personnel are "flagged down" on the street and informed of a gas leak which is then immediately investigated by those same qualified company personnel. Also excluded from the calculation of the performance indicator are responses that are initially reported and subsequently identified as carbon monoxide related.	$\geq 75.0\%$ Percentage
7	Workable Gas Leak Year End Backlog Leak management is the largest single component of the work performed by Gas Operations. Leaks are classified by the degree or extent of the potential hazard resulting from gas leakage and these classifications as well as the prescribed remedial actions, are defined in the PSC code, Part 255.811 through Part 255.817. Leak repair is prioritized based on these classifications. Workable leaks are those that pose the most risk to public safety. They are defined as Type 1, 2, 2A and 2M leaks.	≤ 75 Number of Backlogged Workable Leaks at Year End
STEAM		
8	Steam System – Normal Pressure Operation This indicator measures our ability to deliver to our customers a dependable steam supply. A measure for determining that the steam system has been operating successfully is the number of low-pressure occurrences due to generation deficiency. The goal is to maintain normal range steam pressure (above 125 psi) in the distribution system for 99.7% of the time. The basis of this goal is to meet or be better than the PSC limit of no more than 20 hours of low-pressure operation during the year. The calculation for Steam Operation within Normal Pressure is: Total hours within Normal Pressure / Total hours of operation.	$\geq 99.7\%$ Percentage
9	Generation Stations – Forced Outages The indicator measures equivalent lost steam generation due to forced outage and partial forced outages and thereby our ability to control process and to minimize the impact of unexpected events. Forced Outages are the removal from service of boilers to an automatic operation or when the equipment is taken out of service on an emergency basis. The number of forced outages is a barometer of equipment reliability and the effectiveness our maintenance program. The calculation for Forced Outages is: # of Forced Outage Hours / (# of Forced Outage Hours + Service Hours).	$\leq 4.0\%$ Percentage
SAFETY		
10	Safety Index This indicator will summarize our performance in the 8 areas listed below. The over all target set for this indicator is 75%. These goals will be tracked using corporate wide target.	$\geq 75.0\%$
10a	OSHA Injury/Illness Incidence Rate (Number of OSHA recordable injuries + illnesses) x 200,000/ hours worked.	≤ 3.39 Rate
10b	Significant High Hazard Injuries Electrical, gas or steam burns, electrical shocks, or falls from an elevation or down a stairway greater than 3 feet, resulting in hospitalization.	≤ 23 Number of Injuries
10c	Public Safety - Related Equipment Failures Number of subsurface equipment failures accompanied by physical injury to people and/or property damage. This does not include equipment failures initiated by contractors or companies other than CECONY.	≤ 292 Number of Equipment Failures
10d	Contractor OSHA Incidence Rate Contractor OSHA Injury/Illness rate. (Number of OSHA recordable injuries + illnesses) x 200,000/ hours worked. For 2008, this applies only to contractors working for Construction, in 2009, it will include all organizations.	≤ 3.20 Rate
10e	Preventable Vehicle Collisions Number of preventable motor vehicle collisions. A vehicle accident is preventable when, after investigation, it is determined that the accident was caused by the fact that the driver did not exercise reasonable caution, used faulty judgement, and/or did not utilize principles of defensive driving, while driving a Company, in order to prevent the accident.	≤ 314 Number of Collisions
10f	System Safety - Operating Errors	≤ 115

	An Operating Error is defined as an operating action or omission that did or could have resulted in an unsafe working condition, personal injury, equipment damage, customer or equipment outages, or operation of equipment not consistent with its design. Any failure to properly convey, receive, or record an Operating Order or any other information required by a rule or procedure shall also be documented as an Operating Error.	Number of Errors
10g	Safety Strategy / Work Practice Improvements The number of completed program enhancements as defined in the organization's Safety Strategy, as well as, the number of documented improvements that enhance safe work practices through Close Calls, Time Outs, or incident investigations.	≥ 77 Number
10h	Documented Field Inspections Number of documented field inspections and safety observations conducted by operating personnel (managers, supervisors, planners, or engineers) dedicated to safety.	≥ 18,402 Number of Inspections
ENVIRONMENTAL		
11	Environmental Index This indicator will summarize our performance in the 8 areas listed below. The over all target set for this indicator is 75%.	≥ 75.0%
11a	Late Spill Notifications Notification of environmental releases to appropriate agencies is required based on applicable laws, regulations and standards. Any notification beyond prescribed time limits is considered a late report.	≤ 12 Number of Notifications
11b	Critical Correspondence On-Time Completion Per CEP 12.09, Critical Correspondence is correspondence to a regulatory agency concerning any EH&S matter for which the agency can hold the company responsible under the law. Correspondence to self-report a violation of an EH&S law or regulation would be identified as a critical correspondence, and be processed via procedure to assure an accurate, timely and thorough response.	≤ 1 Number of Overdue
11c	Commitment Tracking (No Overdue Commitments) Per CEP 12.10, EH&S commitments are explicit promises to take specific action, made to regulatory agencies, Auditing, the Independent Monitor or the Ombudsman. A corrective action contained in an EH&S audit report is considered a commitment, and would be tracked to assure completion.	0 Number of Overdue
11d	Reduce Dielectric Fluid Released to the Environment There are over nine million gallons of dielectric fluid in the 630 miles of high-pressure pipe-type feeders in our system. We have instituted an aggressive approach with a goal towards reducing dielectric fluid loss to the environment and continuous process improvement. Our approach focuses on three primary areas: Prevention, Detection and Response. Prevention efforts are geared toward the identification and remediation of corrosion through programs such as manhole inspection, manhole refurbishment, buried coating refurbishment, cathodic protection and feeder replacement. Detection and Response programs are linked and have provided the continuous improvements of our Leak Detection System, PFT active patrols and PFT feeder tagging and improvements in the overall leak clamping process. In addition, these efforts have proven beneficial in the response to third party events such as contractor damages to our underground pipe-type feeders and water impingement associated with a water service or main leak. All releases are reported as required, located and repaired as soon as practical in an effort to provide bulk power in an environmentally sound, safe and reliable manner.	≤ 25,600 Gallons of Dielectric Fluid
11e	Opacity Occurrences not to exceed NYCDEP Standards Opacity occurrences measure how many times visible emissions (smoke) from an operating boiler exceeded NYC DEP standards. The definition of this indicator are those opacity exceedances that measure 20% for two minutes and those that are greater than 40% for any timeframe. This goal measures the ability of the generating stations to meet the steam generation demand while maintaining environmental excellence. This goal is based upon prior three year's average performance adjusted for fuel burn. Emissions (smoke) from one of the company's stacks represents high opacity levels and is usually caused by start-up, shutdown or operating upsets. Good training, preventive maintenance and corrective actions minimize opacity incidents.	≤ 227 Number of Occurrences
11f	Reduce SF6 Gas Emissions SF6 gas is used extensively as an insulating medium on CECONY equipment. There are currently over 350,000 pounds of SF6 gas used in equipment such as circuit breakers, circuit switchers, auto ground switches, and gas insulated bus. Over time, this equipment may develop leaks which allow SF6 gas to escape into the atmosphere. Besides the detrimental environmental effects, SF6 is a major operating cost for Substation Operations. Gas losses are tracked, and equipment that is discovered to be leaking is evaluated for repair or replacement. The goal is to continue efforts toward reducing the amount of SF6 gas consumed on the system. CECONY has entered into a Memorandum of Understanding with the EPA to work towards continuing to reduce our SF6 leakage.	≤ 95,000 Pounds of Gas Emitted
11g	Do not exceed NOx Emissions limit during any 24-hour period within Ozone Season – (May - September) The goal is to be at a daily allowable NOx limit target of 100% during the Ozone Season (May – September). This goal measures our compliance with the NYS DEC emissions standards for NOx (nitrogen oxide, a by-product of combustion). This indicator measures the ability of the generating stations to monitor and control the amount of NOx that is released into the environment. The basis of this goal is to continue to sustain our NOx performance. During the ozone season, station	100.00% Percentage of Time

	personnel continuously monitor emissions levels to assure emissions remain below the regulatory 24-hour level.	
11h	SPDES Exceedances Facilities that discharge wastewater to the surface waters or ground waters of the State operate wastewater discharge outfalls that are permitted under the State Pollutant Discharge Elimination System (SPDES). We track the number of times the discharge limits stated on the SPDES discharge permits have been exceeded. Increases indicate that there maybe a problem with the facility and/or preventative maintenance of the facilities SPDES related equipment. Discharges in excess of prescribed limits must be reported.	≤ 4 Number of Occurrences
EMPLOYEES		
12	Employee Development Index This indicator will summarize our performance in the 8 areas listed below. The over all target set for this indicator is 75%. These goals will be tracked using corporate wide target.	$\geq 75.0\%$
12a	Key Positions filled Via Succession Plans Measures the number of positions filled utilizing the candidates on succession plans which are developed by each organization to fill Band 4 positions and above.	$\geq 75.0\%$ Percentage
12b	On-Line EEO Sensitivity Awareness & Sexual Harassment Training This e-learning module will present employees with the Company's EEO policies as well as federal, state and local laws. This enables employees to develop the skills needed to foster an inclusive environment and understand their responsibilities under the EEO policy and the law.	$\geq 3,700$ Number of Employees
12c	Managers Completing Leadership Challenge and Business Academy Measures management's support of continued development by encouraging attendance at the above programs. Leadership Challenge I & II are directed at new managers and mid-level managers respectively. Similarly, the Business Academy, a two-week off site, executive development program targets senior leaders capable of increased responsibilities.	≥ 175 Number
12d	Number of Mentees in Mentoring Program Incorporated into this goal is the Corporate Mentoring program for employees in Bands 1-3 and the second level, the Executive Mentoring Program, for Band 4 candidates.	≥ 70 Number
12e	Students Passing Promotional Exam Upon Completion of Career Path Training Measures the percentage of employees passing promotional exams upon completion of career path training.	$\geq 80.0\%$ Percentage
12f	Students Completing Leadership Training Classes Measures the number of management employees developed through attendance at Leadership programs. A total of 30 programs are offered in multiple sessions throughout the years.	$\geq 4,000$ Number
12g	Number of Team Program Graduates Measures number of employees who have successfully completed all required training and made a final presentation to qualify for completion of the transition to management program.	≥ 150 Number
12h	Training Modules Developed on E-Learning The development of additional eLearning courses is measured by the number of courses we post to our production site on the TLC eLearning Central portal. At the completion of the final review of instructional delivery of content we will test the functionality of the eLearning course on our test site. If the course works correctly, then we post the course on our production site, which makes it available to all employees. It is at this point we take credit for an eLearning course completion.	≥ 30 Number

Exhibit VI.2: KPI Display

KPI Display



	Net Income	
	O & M	
	[-] Major Groups	Budget
	Electric Operations	
	Customer Operations	
	Uncollectibles	
	Gas Operations	
	Central Operations	
	Interference	
	Environment Health & Safety	
	Business Shared Services	
	Enterprise Shared Services	
	Public Affairs	
	Finance	
	Law	
	Auditing	
	Chairman Of The Board & Ceo	
	Off Of Pres & Chief Oper. Officer	
	O&R Support Of Shared Services	

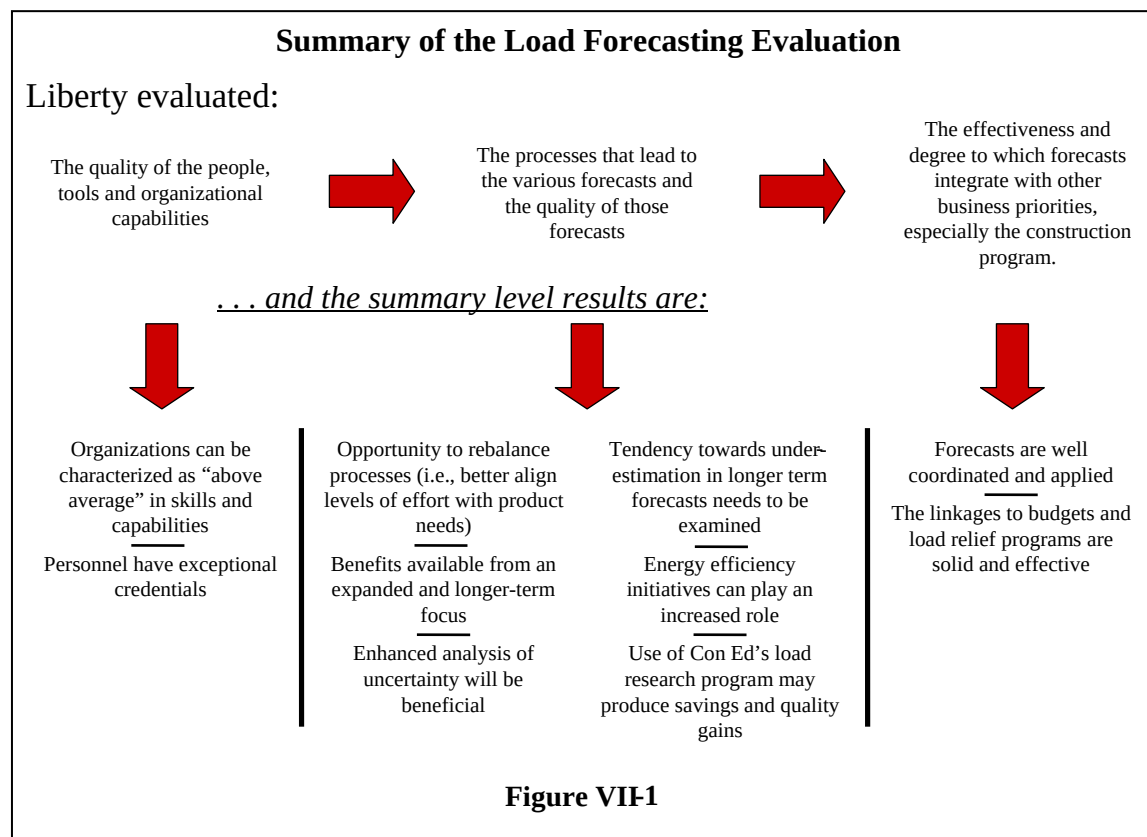
Color Key
On Target 
In Range 
Off Target 
No Budget 
* Immediate
** Previous Month Data

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VII. Load Forecasting

CECONY organizes and manages load forecasting activities well. The Company has done a good job of building a quality staff with sophisticated tools and capabilities. CECONY's more general cultural restraints, such as an inward focus and a tendency towards short-term thinking, affect the load forecasting functions; however, the results achieved are generally good.



Notwithstanding a solid foundation, there are opportunities for improvement, several of which have already been embraced by the Company, and for which improvements are already under study. The two most important initiatives in this regard are a rethinking of how resources are applied to various load forecasting products and a broadened, longer-term view of load forecasting. The preceding table illustrates Liberty's summary-level conclusions.

A. Background

The function of load forecasting fills many needs within a utility; *e.g.*, setting the basic assumptions leading to the determination of supply and infrastructure needs, and providing broader support to management and planning processes. It also plays a large role in ratemaking and financial planning; load forecasts form the basis for revenue projections. Many utilities' load forecasting functions also serve as the corporate "crystal ball", evaluating long-term industry trends and providing insights to managers on the potential for high impact shifts in the industry.

Liberty examined all of these roles, although our primary interest was in load forecasting's place in the construction program. In that role, load forecasting is at the "head end" of the process. It sets the planning basis that defines the service demands that will be placed on the Company. These demands will be stated in terms of both peak requirements and the overall volume of the commodity. CECONY employs separate but similar processes for each parameter and for the electricity, gas, and steam businesses.

System planners comprise the chief users of the load forecast data.¹ Their need for good data cannot be overstated – too low and there will be reliability problems, too high and overbuilding and wasted money will be the result. It becomes clear then that the inputs of the load forecasting organizations early in the process will continue to reverberate throughout the entire construction program, from the priorities that are set for various facilities to their size, location, and technical attributes.

The need for an independent load forecasting function should be clear when one considers the ramifications of their work. This applies to much more than the construction program, as financial projections, rate demands, and other far-reaching consequences are a result. In addition to a technical excellence, then, there must also remain a "purity" of the results, so that the entire company is working with the same, trustworthy predictions – predictions based on strong data and objective assumptions and not oriented towards self-serving results.

Liberty conducted its evaluation of the load forecasting processes and organizations pursuant to a detailed work plan. That plan defined the specific areas to be addressed as follows:

- Organization and capabilities
- Models, methods and data
- Criteria and assumptions used in forecasting
- Forecast disaggregation – applications and level of detail
- Major influencing programs, events and eventualities
- Integration of forecast results with corporate processes.

Within each of these categories, specific evaluation criteria were defined and activities identified to perform the requisite evaluations against those criteria. The work plan set a total of 27 criteria, all of which the *Conclusions* section of this chapter addresses. The criteria by which Liberty evaluated load forecasting included the following:

- Organization and staffing
 - Forecasting should be conducted by well-trained and experienced personnel familiar with the capabilities and limits of models used, with recent and likely changes in the economic and other factors that affect load in the serving area, with recent experience at other similarly-situated enterprises, and with the differences in factors that affect CECONY's electricity, natural gas and steam businesses.

¹ Needless to say there are many important users of the load forecasts around the Company. For purposes of the construction program, however, the principal hand-off is to the system planners.

- The forecasting functions should be somewhat independent of the investment ramifications of their forecasts.
- Organizations charged with various elements of the forecasting process should be suitably integrated and coordinated to assure consistent results and applications.
- Models and data
 - Forecasting should be supported by comprehensive, accurate models that are sufficiently robust to address the drivers and uncertainties faced by the company.
 - These models should be subject to continual revision and updating.
 - The accuracy of forecasts should be checked and appropriate adjustments made to future forecasts and methods via a structured feedback program.
 - Models should have suitable documentation including training materials to facilitate their consistent use and for transfers of employee responsibilities.
 - A QC process should be in place that assures correct functioning of models, accurate inputs and results as designed.
 - Models should have capabilities suitable for analysis of uncertainty, such as probabilistic and sensitivity analysis.
 - Reliable actual load data, on an area, network or facility basis, should be available to gauge trends and from which to project accurate forecasts.
- Criteria and assumptions
 - Forecasting for the electric, gas and steam businesses should use consistent assumptions, be conducted on a reasonably contemporaneous basis, and recognize interdependencies.
 - Company forecasting processes and results should be consistent with what is needed for effective coordination with NYISO's role in forecasting for the state.
 - The basis for assumptions should be well documented and tested.
 - The Company should be suitably involved with regional planning and business groups to have a ready source of data for economy-driven forecast issues.
 - Formal, structured criteria should be in place to define and guide requirements for the forecasting process.
 - Forecast assumptions and inputs should be determined independently of any desired or "required" outcomes.
- Forecast disaggregation
 - Forecast disaggregation should be based on physical or economic boundaries, as appropriate, and should be accomplished with processes that preserve as much as possible the unique characteristics of each disaggregated unit.
 - Network forecasts should be suitably network or area specific to permit effective planning and operation.
 - In addition to peak forecasting, a program of load research should be in place that accurately identifies load patterns for varying customer classes and their impacts on the forecasting and planning processes.
 - A structured program should be for major customer expansions that monitors significant pending load additions and their impacts on forecasts and planning.
- Analysis of major influences
 - Systems should be in place for accurately gauging the impact of DSM initiatives, load reduction practices and other tactics for local or system load mitigation so as to facilitate incorporation of those considerations in load forecasts.

- Forecasts should reflect public policies and guidelines for demand- and use-affecting programs, should include robust estimates of their effects, and should address their uncertainties fully.
- Studies of potential major load-impacting factors, such as new technologies, new laws or regulations, new weather trends, economic trends, price elasticity, etc, should be conducted periodically to anticipate potential significant perturbations.
- A program to track and forecast the migration of customers to or from competitive suppliers should be a part of the forecasting process.
- Integration with planning and budgets
 - Forecasts presented to the Commission for use in regulatory proceedings should be current, use consistent input with those used for internal forecasting purposes, and sufficiently transparent to support adequate stakeholder and Commission review.
 - Forecasts should contain a long-term component, and short-term decisions should not be made without a supporting long-term context.
 - Forecasts should be an input consistently applied to the O&M and capital budgeting processes.

B. Findings

1. Organization and Capabilities

Two primary organizations participate in load forecasting processes: the Demand Forecasting (DF) Section (formerly known as the Peak Load Forecasting Section) of the Resource Planning Department and the Revenue and Volume Forecasting (R&VF) Department in Corporate Accounting. As the names imply, the responsibility of the former is determination of peak demand, with volume estimation being the responsibility of the latter.

a. Demand Forecasting Section

The DF Section presently has 13 people, and has varied between 10 and 13 in recent years. The group makes up about half of the Resource Planning department. Most of the staff members have MBAs. They produce the key economic forecasts and update them at least once a year, or as conditions warrant. DF is responsible for demand forecasting for electric, gas and steam. The major forecasting products for electric are:

- The peak day forecast for the system
- Peak demand for individual networks
- The coincident peak demands for networks
- Daily demand.

For purposes of this audit, the primary application of the electric load forecasting data is for transmission and distribution load relief planning. Daily demand forecasts support supply needs and capacity planning and are hence of less interest for the scope of this audit. The Section prepares the long-term winter peak demand forecast for natural gas as well as the daily and long-term peak demand forecast for steam.

b. Revenue and Volume Forecasting Department

The R&VF Department currently has a staff of 13. Their responsibilities include:

- Develop short and long term forecasts of energy requirements for the electric, gas and steam systems.
- Prepare monthly forecasts of delivery volumes and delivery revenue used in annual budgets and rate case filings.
- Prepare exhibits, supporting data and testimony for rate cases for CECONY and Orange and Rockland Utilities.
- Prepare monthly reconciliation of CECONY and O&R delivery volumes and revenue variations from budget and prior year.
- Develop forecasting methodologies including econometric and statistical models utilized in forecasting energy requirements.
- Represent the Company at rate proceedings, at meetings with regulators and in dealing with governmental agencies in matters relating to forecasting.
- Collect, maintain and distribute service area weather statistics.
- Prepare annual update of normal Heating and Cooling Degree Days.

Peak loads for purposes of load relief planning are the responsibility of DF; however, their forecasts depend on the R&VF volume forecasts.

The professionals in R&VF have extensive related work and educational background in economics, statistics and other fields important to the forecasting process.

c. Integration

The Company has utilized various organizational approaches in the past. Under them, the relative organizational distance between the two functions has not always been this great. The nature of the forecasting process is such that distant groups create the possibility of duplication, poor coordination, and inconsistent applications. There is no evidence of these results, however; the groups seem to function on a coordinated basis with no duplication of effort. Further, there is follow up with user groups to assure consistent applications.

d. Related Organizations²

Other organizations with important steps in the preparation or use of electric load forecasts are:

- Area Station Planning develops the Area Substation and Sub-transmission Feeder 10-Year Load Relief Program. The long-term Network Area Forecast is utilized to develop the Load Relief Program.
- Electricity Hedging and Market Analysis derives the base for calculating the amount of future hedges. From the CECONY Service Area Load Component Report, they utilize the service area load forecast, primarily the full service (excluding retail choice) load component to develop annual electricity hedge volumes.

² See also the list of organizations under “Integration of forecast results with corporate processes” later in this chapter.

- Rate Engineering determines estimated Market Supply Charges for capacity for the Company's five year operation budget. To the extent it is available in time, they use the CECONY Service Area Load Component Reports to estimate growth in peak load.

Other organizations with important steps in the preparation or use of gas forecasts are:

- Gas Purchasing and Scheduling develops and executes short-term (one-year or less) contracting plans. They receive the Peak Demand Forecast, and use it to determine the quantity and duration of commodity and capacity resources needed.
- Gas Transportation and Planning develops and executes long-term contracting plans. They also receive the Peak Demand Forecast and utilize it to determine the quantity and duration of capacity resources needed.
- Gas Engineering maintains system network analysis models utilized to determine where reinforcement work is required on the system for the short and long term. They compare the Peak Demand forecast to the load in the model to ensure growth is captured.

Other organizations with important steps in the preparation or use of steam load forecasts are:

- Steam Resource Planning develops the Capacity, Load, and Reserve Table which is used to compare the amount of production resources to the peak demand and to calculate the reserve margin for a given forecast period. Additionally they determine the Loss of Load Expectation (LOLE) utilizing the Multi-Area Reliability Simulation (MARS) system for a given set of resources and load assumptions. Annual Winter Peak Demand forecast is utilized as an input to the Capacity, Load and Reserve Table and to the MARS system.
- Steam Operations Planning utilizes steam sales forecast to develop annual steam and electric production forecasts from steam only and steam-electric generating units using PROMOD simulations. These PROMOD simulations are used for studies, plans, budgets/cash flows, and rate cases. Annual Winter Peak Demand forecast is utilized in steam system pressure and flow simulations using the STONER model. STONER model runs are used for studies and plans.
- Steam Business Development provides to Forecasting and Planning groups information regarding estimated hourly loads (pounds per hour) and annual sales (mlb per year) for all known future projects. They interrelate with Forecasting and Planning Groups with on-going load/sales information as new business opportunities arise.

e. Independence

The organizations with primary responsibility for load forecasting (DF and R&VF) report no undue influences or pressure from management or other organizations. An annual review is held with senior management, including the CEO, where assumptions and results are discussed. There is no effort in such meetings to revise outcomes in favor of other corporate priorities.

2. Models, Methods and Data

Liberty examined the load forecasting processes employed for electric, gas and steam. The results are discussed in this section in terms of the processes, models, weather inputs, accuracy considerations, documentation and provisions for uncertainty or sensitivity analysis.

a. The Electric Load Forecasting Process

The Company characterizes its demand forecasting process as consisting of three main elements: a weather adjustment process, a top-down evaluation, and a bottom-up evaluation. These three largely quantitative elements are then brought together in a generally qualitative way to produce a final forecast.

i. Weather Adjustment

Since peak electric load is largely a function of temperature, any discussion or analysis of load needs to be framed within a uniform set of temperature assumptions. The relevant considerations include load assumptions for purposes of system design; *i.e.*, a design temperature that equates to a resulting system load must be stated. For these purposes, a “temperature variable” (TV) is defined, and CECONY has chosen a TV of 86°.

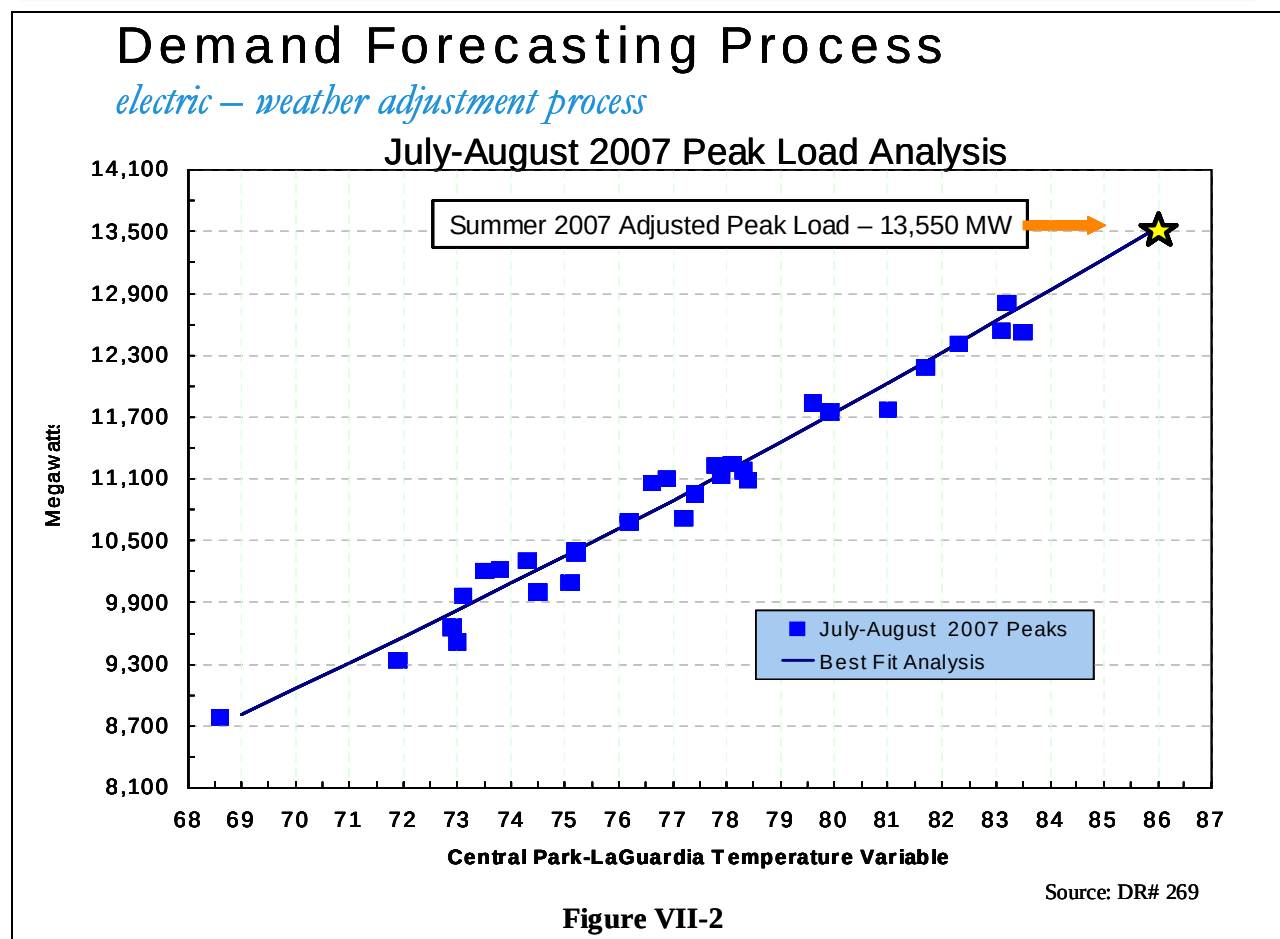
The TV considers humidity, and therefore is not simply a dry-bulb temperature; *i.e.*, that included regularly in weather reports. Rather it combines dry and wet bulb temperatures to produce a value that is more consistent with a comfort index or the Heat Index used by the weather service. In this context, the TV of 86° equates to a Heat Index of 105°.

Several days of hot weather create a “build up” effect that further increases electric loads. As a result, the TV is further redefined to provide an indication of heat over several days. CECONY does this by weighting the current day at 70 percent, the previous day at 20 percent and the second previous day at 10 percent.

There has been considerable debate in New York on the appropriateness of the TV chosen by CECONY. The question has been raised in prior reliability reviews by outside agencies and the Company has commissioned various studies to validate its choice. The 86° TV was selected from a history of more than 50 years by choosing the one-in-three value; *i.e.*, by ranking all 50-plus years of peak eliciting conditions (defined as July/August weekdays) in order of temperature and selecting the value at which the upper one-third of the list starts. The NYISO standard is the one half point, which would result in a lower TV and lower loads³. CECONY estimates that a 1° change in TV equates to a demand of about 300 MW, but this relationship drops to about 150 MW per degree at the upper part of the curve.

For load forecasting purposes, it is necessary to correlate the TV to load. CECONY determines the TV and actual load for each summer day. The load is adjusted as appropriate for demand reduction programs that may have been triggered, voltage reductions, major outages, customer load reduction appeals and (for Friday data) the natural decline experienced on that day. Data analysis then produces an estimate for what demand would have been at 86° TV. Hopefully, there are data points near that value, but the best available data is used in any event, and calculated via regression. The following figure illustrates this process.

³ NYISO Load Forecasting Manual (Manual 6), Section 2.2.3



ii. Top-Down Evaluation

CECONY uses an analytical approach that estimates commercial and residential loads. They refer to this approach as “top-down,” and it is the second element of the electric peak load forecasting process. Two different models are used, one for commercial and one for residential. The commercial model is an econometric model used by R&VF. Its principal inputs are GDP, employment, number of customers, weather and real price of electricity. It employs about 25 years of historical data. The model produces a volume forecast which is converted to peak demand via load factor. The econometric model includes a constant term that translates to a base annual growth rate independent of the other variables⁴. It is not clear that the experience of 25

⁴ As part of its review of a draft of this report, CECONY has recently advised Liberty that “the constant term in the long term econometric model does not translate to a base annual growth rate”. Liberty’s conclusion to the contrary was based on interviews with those responsible for the model, including the comment that “constant (intercept) is basic year-over-year growth rate for that class; i.e., growth rate if other coefficients turned out to be (or are set at) zero”. This is confirmed in DR912 where the constant is translated into an identical “implied annual base growth rate” and again in DR913 which states “the constant term of 0.012393 for the SC 1 model **translates to a base annual growth rate** (our emphasis) of 1.24% for SC 1 sales”.

years is representative in this regard since more recent trends suggest lower underlying growth rates.

The residential model is the responsibility of DF. Primary inputs are derived from customer survey data supplemented with employee surveys and photos of representative customer locations. About 2,500 customers are surveyed each year on five hot days. Information on air conditioning, appliances, behaviors and occupancy is solicited. Information on number of households is obtained from the census and forecasts are obtained from external services (e.g., Moody's).

iii. Bottom-Up Evaluation

The final element of the peak load forecasting process is a so-called bottom-up approach, which features several drivers, the most important of which is new construction. Other factors in the commercial evaluation are office vacancies, employment and city planning activities. Other factors in the residential evaluation are average household use, additional households, internal growth and city planning activities. The bottom-up evaluation of the final sector, government, includes new projects, city and state plans and internal growth. New projects represent the key to effective network forecasting; therefore, CECONY's program for identifying and tracking them is especially important. This program will be discussed later in this chapter.

The results of the top-down and bottom-up evaluations are judged and a composite result for forecasted growth in peak demand is decided upon. This is adjusted for the DSM forecast to produce a final result. A corresponding forecast for each network is also prepared by allocating the system-wide growth among networks with specific consideration for new construction.

The next figure provides a simplified view of the entire electric forecasting process.

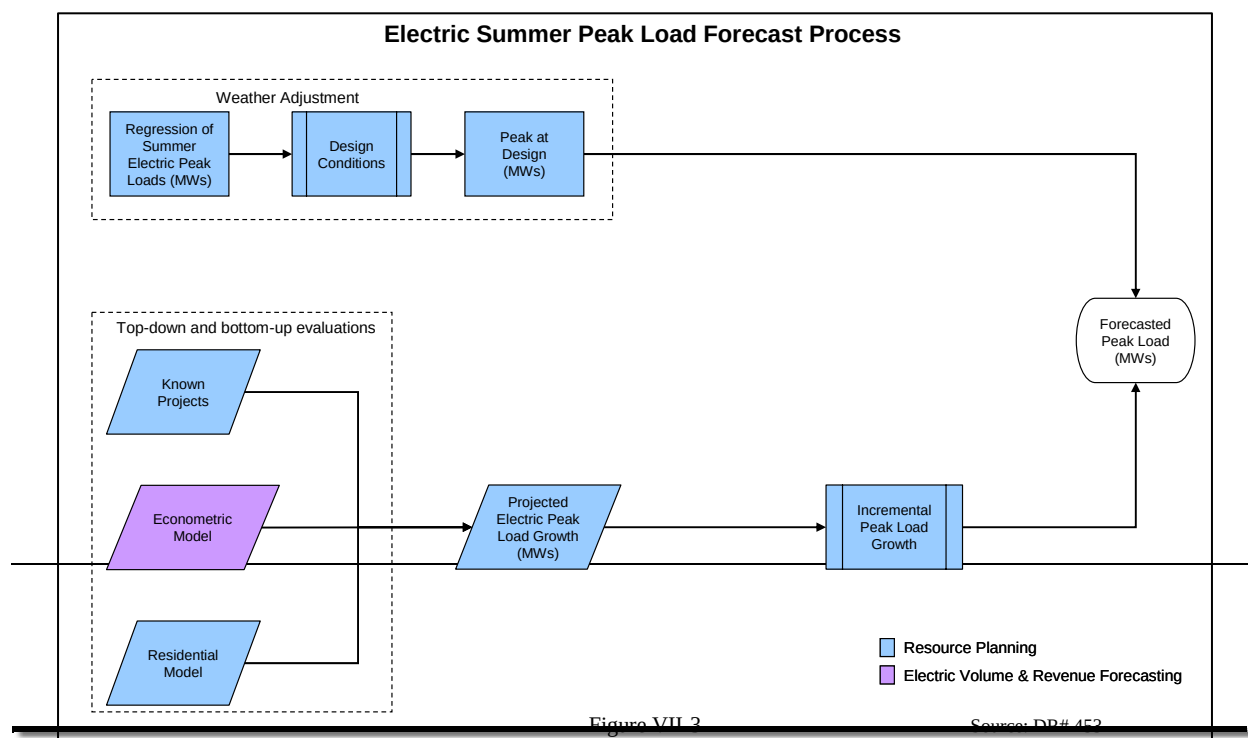
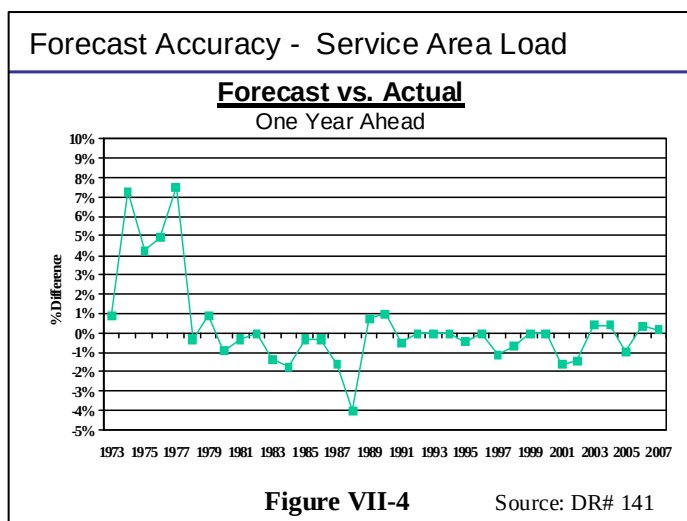


Figure VII.2

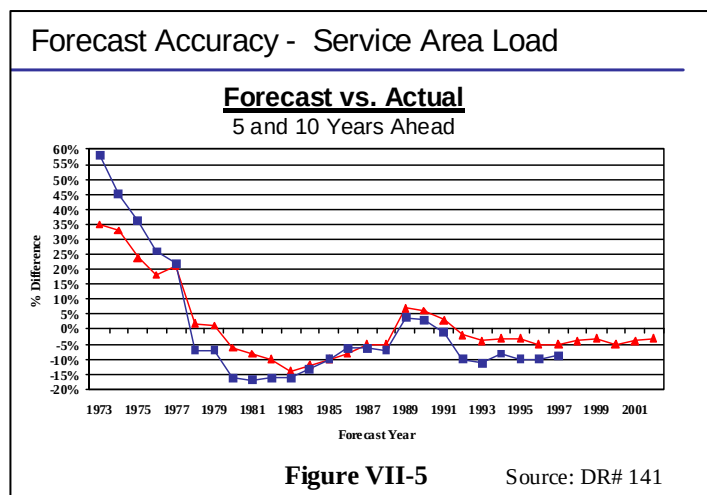
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iv. Process Accuracy and Quality

Figure VII-4 shows that there has been very little variability in the one year forecast, with the variance exceeding 1 percent only four times in the past 20 years, with only one of those occurrences in the same period exceeding 2 percent. The message is clear – there simply is not much variability or uncertainty associated with the year-ahead system-wide peak load forecast, and that begs the question of just how much effort and sophistication is warranted in estimating the next year's peak.



The next figure shows the variances associated with the 5 and 10 year forecasts. These have recently averaged less than 5 and 10 percent respectively. It is significant that the variances have developed into both a consistent value and a consistent direction; *i.e.*, the longer-term load forecasts have been consistently under-estimating the peak. Any conclusions here must be tempered by the reality that these forecasts were made many years in the past and we are judging



assumptions and approaches that have long been forgotten. There is therefore little to learn from looking backwards at this data, but it is nonetheless beneficial to raise the obvious question: has this bias towards under-estimating the peak continued or have the causal factors been understood and corrected?

For performance monitoring purposes, CECONY looks at forecast accuracy in a different light. Resource Planning (DF) uses two key performance indicators (KPIs) that examine the

accuracy of the daily load forecasts and the annual network forecasts.

Daily load forecasts prepared each morning predict that day's peak. Each day's accuracy (with no adjustment for weather) is measured and the results averaged for each month and annually. The KPI target for the year is ± 2 percent. This has interest for daily operations but is of less interest to the scope of this audit.

Network accuracy, with its obvious impact on load relief efforts, is of more interest. The KPI establishes a target (less than 18) for the number of networks whose forecast accuracy exceeds

±2 percent. The actual number of networks falling outside the 2 percent range was 11 and 9 for 2007 and 2008 respectively. In most cases, the network peaks were over-estimated with only 11 and 10 networks being under-estimated in 2007 and 2008 respectively.

Internal KPIs in R&VF (not associated with variable compensation) are more oriented towards timely completion of various tasks, although they too have some accuracy goals. The R&VF KPI associated with variable pay compensation is focused on accuracy. It is easy to be critical of the load forecasting KPIs, but not so easy to develop replacements. The load forecasting process does not easily lend itself to meaningful quantitative performance measures. The deliverables produced by the various organizations are required to meet the business needs of other organizations, and the degree that they comply with those needs will often be subjective. Suffice it to say that the accuracy indicators do not tell us much about the overall quality of CECONY's forecasts or the forecasting process. In any event, there is no reason to question the quality of the inputs, the process or the methods used.

v. Documentation and Training

A common shortcoming of many organizations that employ complex models is weakness in documentation as well as a lack of succession planning, or provisions for future turnover of the process. In this regard, Resource Planning has started an effort to prepare manuals for all elements of their forecasting process. These manuals, many of which are currently in a draft stage, represent a positive contribution towards meeting the documentation and training challenge.

The documentation challenge, and more importantly the presentation of key organizational functions in a clear, understandable way, appears to be a general problem with many CECONY organizations. This hampers communications with outsiders (such as the regulator and other agency reviewers), lessens the confidence others can generate in the Company and limits internal relations, whether they are with new employees, other departments or senior managers seeking to better understand and evaluate important issues.

vi. Forecast Uncertainties

By definition, forecasting is a game fraught with uncertainty, yet CECONY does not appear to invest a great deal of effort in the examination of uncertainties, the evaluation of forecast sensitivities or the ramifications of unanticipated trends or events. Given the sophistication of the Company's staff and their tools, this is a lost opportunity. Such planning initiatives can expose threats and opportunities as well as provide valuable insights for the Company's long-term planning initiatives, including its enterprise risk initiatives.

In response to specific questions, the Company reported the actions taken when short-term forecasts are inadequate, but it does not address the issues of: (a) how long-term forecasts are tested for uncertainty, (b) any planning the Company does to gauge the exposure to inadequacies, (c) the consequences of such inadequacies, and (d) any appropriate contingency planning. The Company does not have any studies or reports that consider the probability of significantly higher loads and the impact of such an outcome.

b. The Gas Load Forecasting Process

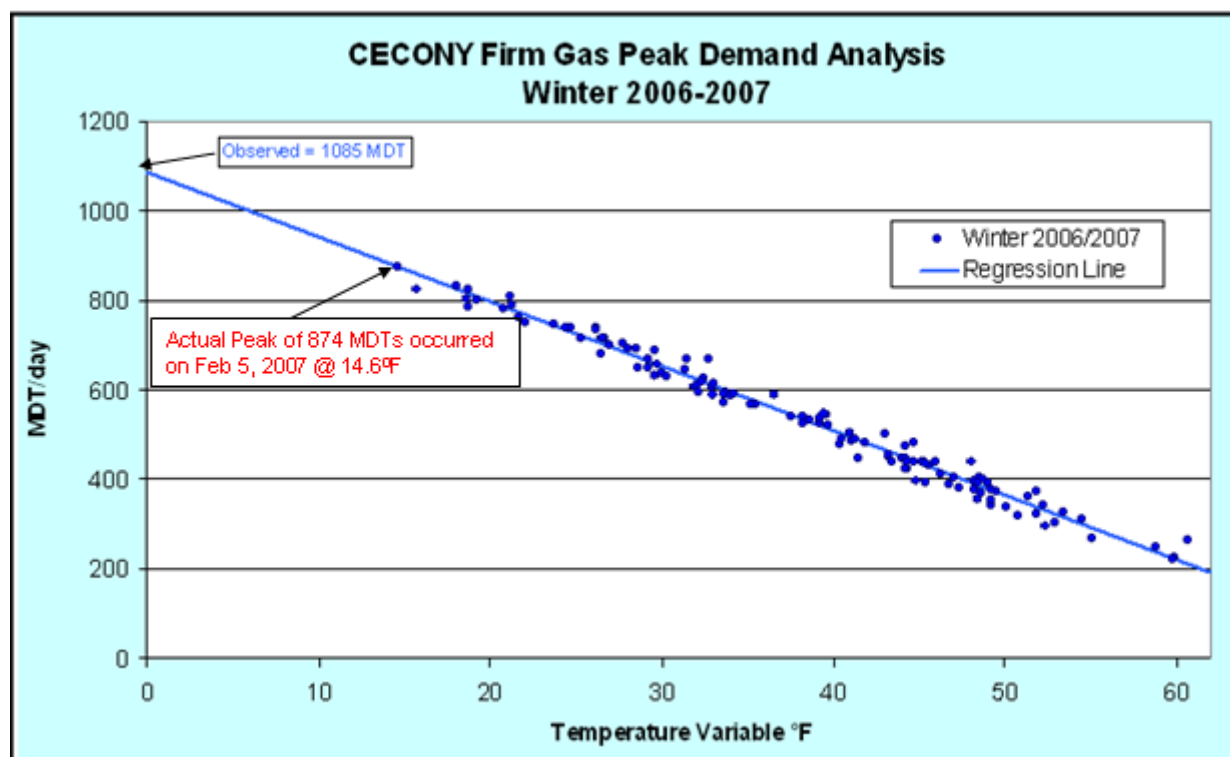
The peak-load forecasting process for gas uses a base-year-plus-growth-rate approach similar to the one used for electric business purposes. The current year's peak sendout to firm customers is first adjusted to what it would be at the Company's design criterion for its peak day, which is based on a temperature variable (TV) equal to zero degrees Fahrenheit. The TV is a weighted average of the current and prior gas day average temperatures. The peak forecast is calculated as an additive process applied to the base peak. The base is determined using the most recent winter period where the load is weather adjusted using current design criterion. Details of the process follow.

i. Adjust This Year's Sendout to Design Weather

Like that of electricity, this adjustment is estimated with regression analysis. At the end of each winter, firm sendout is regressed against a temperature variable for each day in the months of December through March. Similar to electricity, the temperature variable is a combination of the current day's temperature and the previous day's. To get the best combination of the two days, Load Forecasting tests various weightings to see which combination gives the best fit. The process is repeated every year but, in recent years, the combination of 70 percent today/30 percent yesterday has given the best fit.

Typical results of this process are shown in the figure below. The actual values are the points along the regression line. The regression line is extrapolated to the design criterion (0° F), and that value is the base for forecasting the peak going forward.

Estimation of CECONY Firm Gas Peak Demand



The figure shown is the regression for the winter of 2006-2007. The actual peak firm load experienced in that winter was 874,000 Dth, which occurred on February 5, 2007. The conclusion from this analysis, however, is that, if the design condition⁵ had occurred, firm sendout would have been 1,085,000 Dth. The latter figure becomes the basis for forecasting the peak going forward.

The next step is to apply an incremental amount of gas demand to the base peak. DF obtains the incremental amount of gas demand by analyzing R&VF's throughput (sales plus transportation volumes) forecasts.

ii. Throughput Forecasts

R&VF forecasts gas throughput by month for the next five years. Throughput is forecast by customer class. Forecasting methods differ among customer classes, as the Company is experiencing a variety of changes in its customer mix. Among those changes are the following:

- The largest number of gas customers, about 600,000, use gas only for cooking. One of the most significant developments in the Company's customer base, however, is the addition of space heating by those same customers. Thus, forecasting those two classes –

⁵ Recall that the design condition is a temperature variable of zero degrees Fahrenheit, composed of a 70/30 weighting of today's and yesterday's average temperatures. Each of those averages came from hourly readings of the temperature at Central Park, beginning at 10:00 a.m. on each day.

residential heating and residential non-heating -- requires estimating the rate at which existing non-heat customers will add space heating, then adjusting the numbers of customers in the two classes to reflect the change.

- The Gas Business Unit (GBU) has about 120,000 small commercial customers, about half heating and about half non-heating. In recent years, the GBU has added about 1,800 of these customers annually. Forecasts going forward require estimating how much those customer numbers will be affected by current business conditions, and how many of the net customer additions will be heating versus non-heating.
- A recent development is distributed electricity generation. The number of this type of customers is small, but the volumes per customer can be large, depending on the size of the installation.

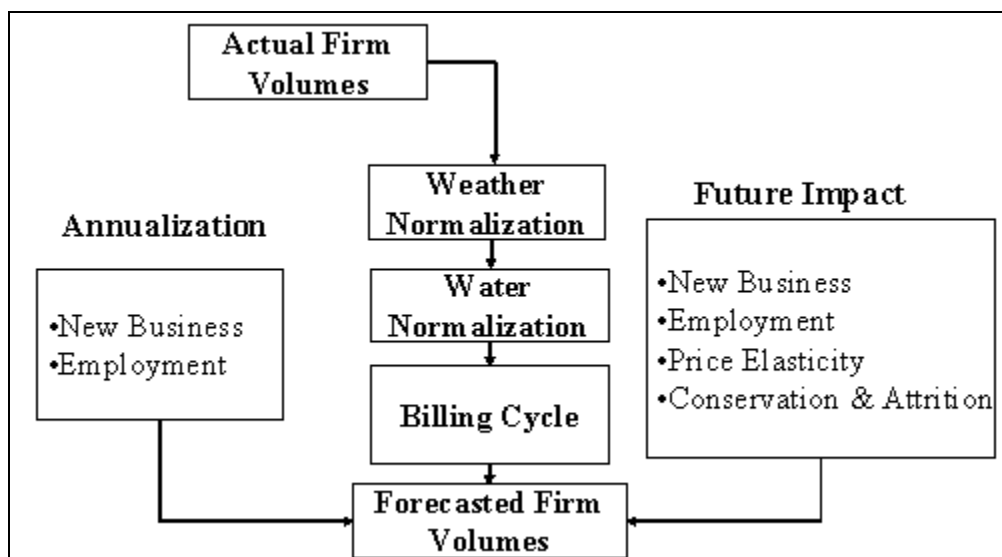
R&VF starts with a review of the most recent 12 months of actual throughput and related data. Throughput for each class is then weather-normalized using regression analysis. Customer response to weather conditions is estimated, and then usage is adjusted for the difference between actual experienced weather and the most current definition of normal weather (which is updated annually). Throughput is also normalized for the difference between actual and normal water temperatures.

Weather-normalized throughput is then adjusted to account for yet-to-be-realized deliveries to customers who were added to the system during the most recent 12 months, plus customers who are anticipated to be connected in the future. Projections of future connections consider both large-volume jobs, reported by the Company's marketing groups, and new small customers, estimated by computer models which consider building permits, prices and other economic conditions.

Customer-class forecasts also consider existing-customer increases or decreases in average usage as they relate to employment and price, conservation related to equipment replacement with more energy-efficient equipment, attrition, and inter-service movement (from/to or to/from firm and interruptible service).

The volume-forecasting process is illustrated diagrammatically in the flow chart below. Key inputs to the process are presented in the table below the chart.

CECONY Gas Firm Volume: Flow Chart



Input	Data Type	Source
Weather	Normal: 30-year average HDD's	Gas & Steam Forecasting
# of New Customers	Customers by class	Energy Services (known projects) Econometric model
PNM employment	Number of workers employed	Economy.com via Resource Planning
Price	Winter Bill Comparison	Gas Supply Rate Engineering
Billing days	Incorporates number of billing days	Meter Reading Operations
Water	Average water temperature	DEP
Conservation & Attrition	Equipment turn over rates & Energy savings factors	Marketing and Sales Customer Surveys
Interruptible Customers	Competitive fuel price analysis Firm transfer analysis	Gas Supply Gas & Steam Forecasting

iii. Growth in the Peak

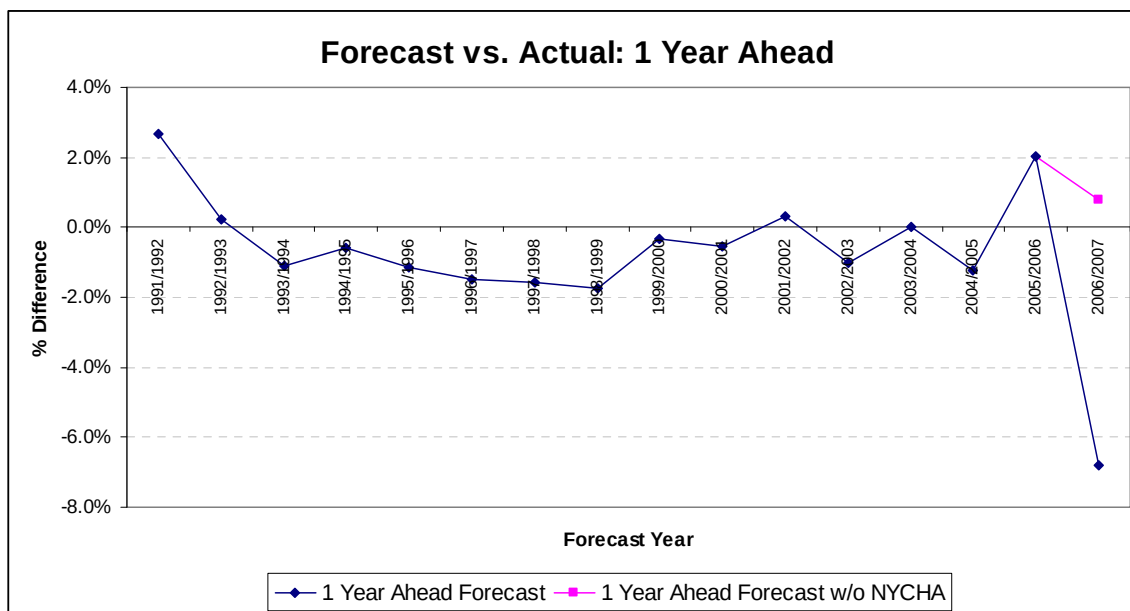
DF uses the aggregated forecast of firm loads to estimate growth in the peak. Recall that R&VF's forecasts occur monthly. DF uses regression analysis to develop use factors for the aggregated load in the winter months. Those use factors are then used to estimate the peak firm sendout that would occur under design conditions (the design condition is based on a temperature variable equal to zero degrees F). Use factors are developed for each of the five years in R&VF's forecast, and peak firm sendout is estimated for each of the same five years.

For capacity-planning purposes, the Gas Transportation Services & Planning Section in the Gas Supply Department needs a 10-year forecast. To accommodate this purpose, DF uses the implied growth rate in the last two years of its five-year forecast, and repeats it for years 6 through 10 of the forecast.

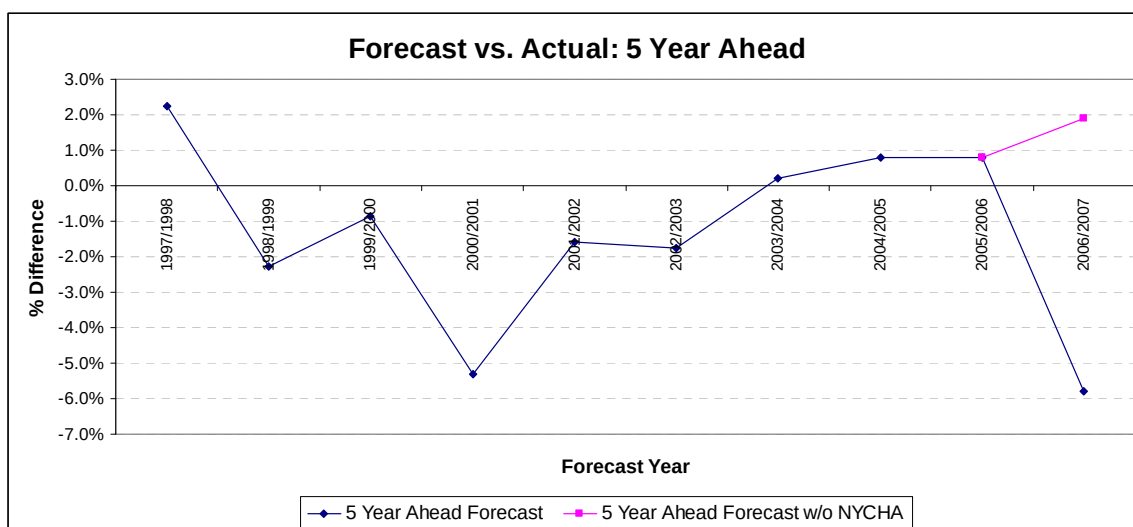
iv. Process Accuracy and Quality

As is the case with electricity, the peak-load forecast for gas has generally been within about one percent when forecasting one year ahead, and within about five percent when forecasting five years ahead. Plots of forecast versus actual firm volumes, both adjusted to design weather conditions, are presented in the diagrams below. (The “outlier” for 2006/2007 occurred because the New York City Housing Authority (NYCHA) converted its buildings from interruptible service to firm in that year.)

Gas Peak Load Forecast Variance- One Year



Gas Peak Load Forecast Variance- One Year



A peak load forecasting manual is also being prepared for gas.

c. The Steam Load Forecasting Process

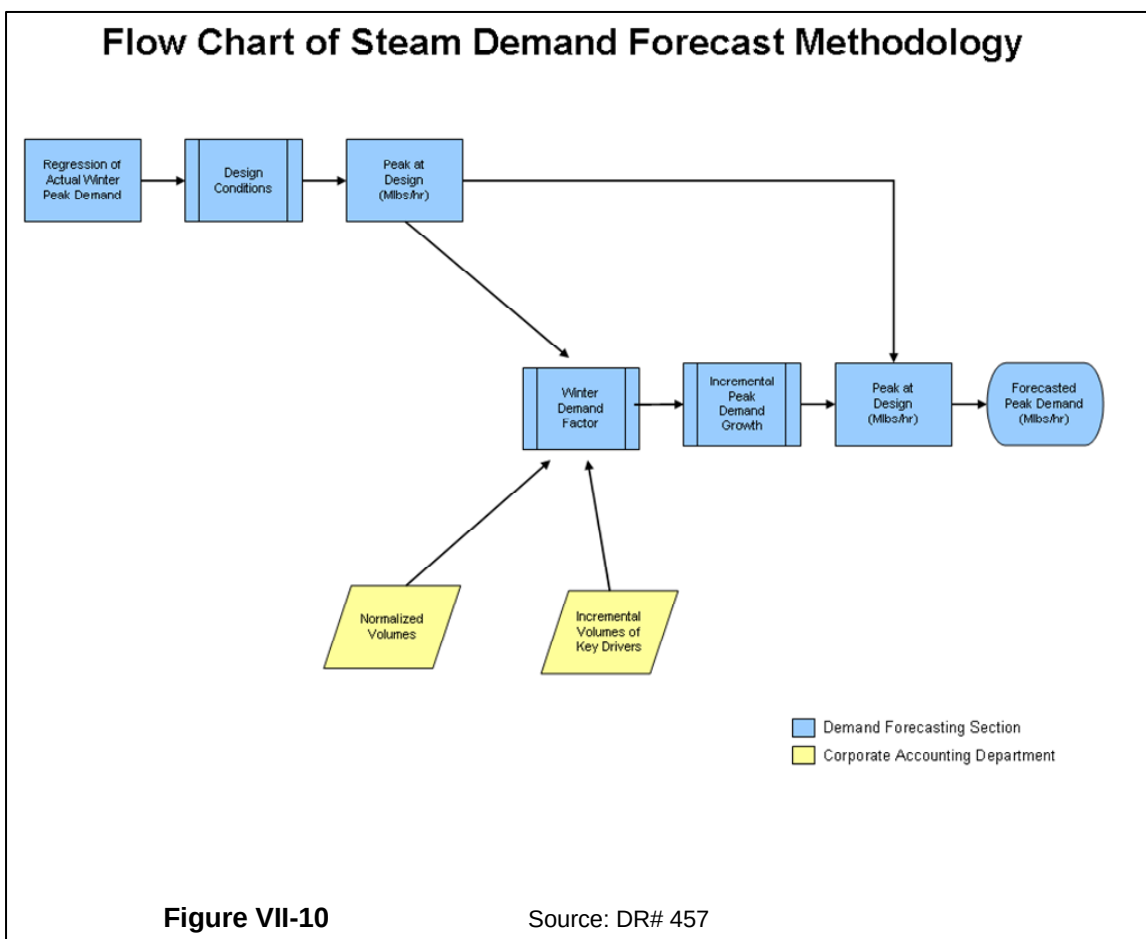
The forecast methodology, as illustrated in Figure VII-10, starts with a determination of a design hour, winter-peak demand. The process, as described by the Company, is as follows:

“Steam usage peaks in the winter because its largest service component is space heating. Projected new business hook-ups and projected economic activity for residential and commercial customer segments are used to determine demand growth. Offsetting this demand growth is a forecast of lost business.”

“The Company develops its long-term steam peak demand forecasts on a ten-year time horizon using internally developed econometric models. The steam peak demand forecast begins by assessing the prior winter’s actual peak demand and adjusting the forecasted peak demand to a design condition for severe weather through regression analysis.”

“The long-term steam peak demand forecast is developed by adding incremental volumes growth of key drivers such as new and lost business and vacant office space which are the same drivers used to develop the Annual Steam Volumes Forecast. The incremental volumes growth is converted to peak demand by using a winter demand factor. These key drivers are projected in terms of incremental peak demand growth and combined with the base steam peak demand at the design condition to determine the Long-term Steam Peak Demand Forecast.”

“The Temperature Variable (TV) is used to calculate and forecast future steam demand, taking into account extreme cold weather conditions sustained over a 24 hour period that can be expected to occur in the metropolitan New York area where Con Edison’s steam system is located. The TV is determined by a regression analysis using the prior winter’s peak demand, the current hour’s dry bulb temperature (the time when the peak demand actually occurred) and the prior 24-hour average dry bulb temperature.”



3. Criteria and assumptions used in forecasting

The selection of criteria and assumptions is of obvious importance to the models and techniques used in load forecasting; however, visibility of those assumptions and testing of them among management is also a critical element of the overall process. Liberty examined the quality of criteria and assumptions, management participation in the process, the use of regional resources in forecasting and the degree to which NYISO requirements are supported.

a. Quality

In general, questions on criteria and assumptions did not receive clear, unambiguous responses, leaving the conclusion that they are not well documented, not integrated in one (or a few) documents, and not communicated internally in a manner that makes the basis for forecasts clear to management. The new Economic Forecasting Manual, now in draft form, provides details on the methods to be used in forecasting various economic parameters, but this does not serve as a communicator of underlying assumptions.

It is therefore more difficult to gauge the overall quality of the basic assumptions made by the forecasting groups in reaching their end results. It is clear that their data sources are sound, including *Moody's Economy.com*, which provides historical and forecast data on many required

parameters. Further, the Company is aggressive in securing other forecast inputs, regional data and in performing analyses with its own data. On balance then, there is no reason to question the overall quality of inputs.

On the other hand, it is particularly important to make visible any assumptions made by analysts that drive outcomes. Without a clear ventilation of such background, in a professional form that allows others to understand the drivers, the forecasting process threatens to become a “black box.”

To the limited extent it is available, documentation of criteria and assumptions appear in the form of presentations to senior management. This is true for both the sales forecast and the peak demand forecast. This vehicle may be appropriate at times, but suffers from obvious limitations, and these are visible in the most recent presentations. An executive level briefing is, by necessity, sparse on details. Also, there is a need to communicate a great deal of other important information in such briefings, including perhaps network impacts, budget impacts and rate impacts. It would therefore appear that an improved vehicle for the documentation, communication and testing of criteria and assumptions would be appropriate.

With the bulk of forecasting activities located in two well-coordinated groups, consistency among organizations and among the different commodity forecasts is not a problem. There is considerable overlap among the commodities in the use of common data.

b. Regional Inputs

Local knowledge obtained through regional planning and economic groups can be an invaluable resource for load forecasting. CECONY in general, and Demand Forecasting in particular, make very good use of such resources. The Company regularly attends conferences specifically dealing with the regional and NYC economies. These are sponsored by such organizations as Moody's, NYC, NYISO and Crain's. Typical knowledge gains from these efforts include US and NY economic outlooks, forecast trends, population forecasts, major construction projects, local development plans and economic and load forecasting methodologies.

c. NYISO Considerations

CECONY meets or exceeds NYISO requirements vis-à-vis load forecasting. Specific data submission requirements of NYISO are:

- Hourly loads for a quarter-year (first quarter is January – March, etc.) within 90 days of the quarter's end.
- Actual load at the time of the NYCA peak including a statement of whether or not transmission losses are included
- The weather-normalized load at the time of the NYCA peak
- The previous five years' values for 2 and 3 (except that weather-normalized data will not be required for years before 2003)
- The MW impact of Emergency Operating Procedures (EOPs) and load modifiers operating at the time of the NYCA peak
- For TOs with locational UCAP requirements, the actual and weather-normalized locality peak load

- Regional Load Growth Factors.

NYISO requirements are fully defined in the NYISO Load Forecasting Manual (Manual 6).

4. Forecast Details

CECONY generates forecasts to a level of detail consistent with each product's needs. For example, sales forecasts require data by service class, demand forecasts are necessary on a network basis and daily operating forecasts are required by hour. These are simply three examples of what are extensive requirements for disaggregation of forecast data in order to meet user needs. For purposes of this audit, detailed forecasts at the network level are of the primary interest since they drive the load relief program and the resulting construction program.

In examining the levels of detail required of, and necessary to support, forecasts, Liberty examined the following areas:

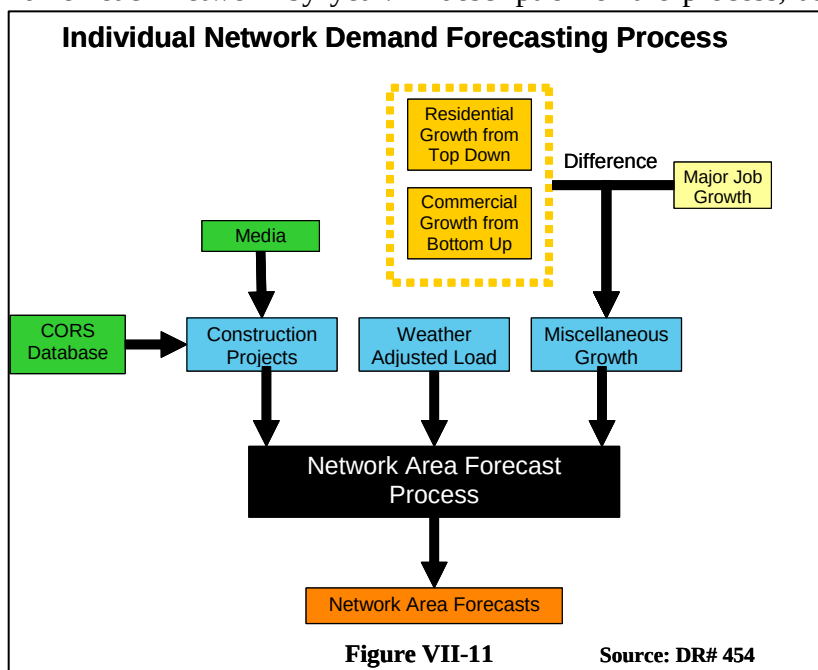
- Breakdown of forecast by network in support of load relief
- New construction inputs to forecasts
- The use of load research data for forecast input.

a. Network Forecasts

CECONY prepares forecasts for all load areas, both on an individual and coincident peak basis. As noted earlier, the chief input to the process is new construction, which will be examined in more detail below. The next figure illustrates the individual network demand process. It results in a 10 year forecast of peak demand for each network by year. A description of the process, as provided by the Company, is as follows.

“In order to ensure integrity and reliability of the network area forecast, the process of top down bottom up forecasting is used. This process evaluates the impact of new construction projects on demand over a ten year period (the bottom up process) and compares it with the demand growth derived in the economic growth analysis (the top down approach). The independent network area forecast is generated first. Once this is complete, the process to

determine the coincident forecast begins starting with the weather adjusted summer coincident peak demand of each network. At this stage the independent forecast is revisited and revised if necessary.



“The following are the major steps of the network area demand forecasting process in the order in which they are done:

- Derive the Incremental Demand Growth from the new construction projects, this is the bottom up approach.*
- Reconcile the total demand growth by networks derived in the bottom up process to the system growth derived in the economic top down process, and derive the miscellaneous/internal growth through this process.*
- Upon receiving the weather adjusted Independent Peak Demand of the networks from the most recent summer study, complete the Independent Electric Peak Demand Forecast by adding the incremental independent demand growth and miscellaneous growth to the independent base peak demand of the most recent summer.*

“The integrity of the data used to determine incremental demand growth is also crucial. Several sources are fielded to acquire the most reliable information. Information sources for future customer demand include:

- Energy Services and Marketing and Sales group*
- Customer Operations Reporting System*
- Customer Information System*
- Dodge Reports*
- Department of City Planning*
- NYC Economic Development Corporation*
- Newspapers, television, building magazines, and other media.”*

The coincident growth is developed by adjusting the independent growth based on a ratio of the three year average of the coincident to independent load, while summing the coincident growth (being derived) of all networks to equal the forecasted total system growth.

b. New Construction

The Company’s program to identify and track new construction projects for load forecasting purposes is extensive and effective, despite limited staff. The effort is managed by Demand Forecasting, which maintains files for each customer service area. When a customer service request is received, the information is loaded into the Commercial Operations Reporting System (CORS) by Energy Services personnel. Other sources of information on new projects include:

- CECONY’s Economic Development Personnel’s Conceptual Load Growth spreadsheet provides a vision capability as they see jobs occurring years ahead of time*
- Metropolitan newspapers*
- Various meetings, seminars or forums with outside agencies or people such as Queens Economic Development Corporation, City Planning, etc.*
- New York City Department of City Planning Website*
- New York City Economic Development Corporation Website.*

For near-term projects (1-3 years), CORS is responsive, with many pages of information on each identified project. Each project is tracked by a customer project manager, is evaluated by Energy

Services for peak load, seasonality, annual load and other important parameters, and is assigned to a network.

For longer-term projects (3-10 years), the other sources above are required. There is considerable interaction with the city for major projects.

c. Load Research

Large utilities typically maintain an electric load research program that supports various efforts in the company that require such data and analysis. The primary need is for rate allocation and design; *i.e.*, load profiles and demand characteristics are required for each class of service in order to spread fixed costs fairly among the classes. The program will include a large sample of customers who are generally deemed to be representative of the class. Interval meter data is gathered and analyzed such that broad conclusions about the class load shape and other characteristics can be estimated.

CECONY's load research program is the responsibility of the Load Research Section of the Rate Engineering Department. Each sampled rate class is represented by 150-200 meters for a total of about 1,000 meters for CECONY and an additional amount for O&R. In addition, CECONY manages load research for NYPA, with about 700 meters in that program.

The Load Research Section picks the samples, designs the measurements and coordinates the overall program, including input to the selection of meters and processing of the data. Data is collected for all 8,760 hours per year. Participants are selected randomly and then verified as representative by field personnel. Data is retrieved by various methods and frequencies, including land line, cellular and meter readers. The varying timing and frequency of collection complicates the analytical cycle.

In many utilities, the load research function is organizationally located close to load forecasting, often in the same department. In those companies, load forecasting makes use of the load research program as a valuable input on customer use patterns and trends. This is not the case at CECONY, where there is no linkage between load forecasting and load research, formal or otherwise. This is potentially a missed opportunity in that some of the research efforts, such as surveys, now conducted by CECONY could potentially be supplanted by load research data. The wealth of information offered by 1,000 strategically placed hourly meters should make some positive contribution to load forecasting, including identification of specific trends and customer behaviors.

5. Major influencing programs, events and eventualities

In addition to the mechanical drivers of forecasts that are routinely incorporated into models, it is essential to monitor and anticipate more global influences as well as ongoing programmatic influences. In this section, Liberty has evaluated:

- DSM and other load reduction initiatives
- Potential major load-impacting factors
- Customer migration.

a. DSM and Other Load Reduction Initiatives

In 2008, New York State mandated a series of energy efficiency measures. CECONY responded to these mandates with an overall program involving various initiatives aimed at energy reduction, including demand savings. CECONY's target is to reach 500 MW of demand reduction from the proposed energy efficiency programs through 2015.

The DSM savings find their way into the construction program in two ways: targeted savings are applied directly at the area substation level while non-targeted savings are spread throughout the system. The most benefit from a reduced investment perspective is of course the targeted savings, which can provide load relief at the network level, thereby deferring improvements into the future that might otherwise be required now. This was emphasized by the Company in its September 22, 2008 filing in which it stated:

The Company has identified potential DSM target areas that will enable the Company to defer significant T&D infrastructure investment and the Company believes that some form of targeted program will continue to be necessary to enable the Company to achieve this investment deferral.

Of the programs proposed by CECONY, then, the one most critical to future construction needs is the "targeted demand side management program." Other initiatives have provided targeted savings and will also do so in the next few years; however, the target program is the primary contributor of targeted DSM in the future. The projected savings are 123 MW of demand by 2015, which is estimated at 82 MW on a coincident basis⁶. Liberty evaluated the load forecasting process, and not the effectiveness of the DSM program. The targeted DSM represents a very small percentage of system load stretched out over a number of years and that enhancements to the program, if feasible, could have a real impact on construction needs. The targeted program is implemented via RFPs, with vendors selected for a specific area and target savings. A pilot program was initiated in 2003 and the program has grown and achieved results ever since.

The Company has committed to a "major study on efficiency potential within the service territory and may also look at potential new technologies crossing all major market sectors that are particularly prevalent in CECONY's concentrated urban environment and have significant energy efficiency gain potential."

For load forecasting purposes, targeted DSM is applied at the network level or, if defined at the substation level, allocated proportionately to the served networks. Non-targeted programs are allocated proportionately across all networks. If efficiency savings are provided for residential and commercial load separately, time-of-day adjustments are made to make the allocation more accurate.

⁶ These targets are as proposed by CECONY in its September 22, 2008 filing, thus they include only the going-forward (2009-2015) contribution of the program defined in the filing.

CECONY has other peak reducing programs, but they are voluntary in nature and hence no credit is taken for them in demand planning. They are valued at 50 percent for operational planning purposes but are not counted at all for network relief.

The NYISO has interruptible programs, known as Special Case Resources or SCR. These are counted in capacity planning but are not available for network relief. As this is an agreement between the end user and NYISO, these customers cannot be made to interrupt for the convenience of the distribution company. SCR load is growing at 15 percent per year, making this a valuable resource that is denied CECONY.

b. Potential Major Load Impacting Factors

As discussed above, CECONY employs many sound practices in its load forecasting efforts. Liberty notes, however, that this positive comment is limited to the more mechanical aspects of load forecasting. The load forecasting processes are focused, perhaps overly so, on the models, historical trends, economic forecasts and near-term realities. The missing ingredient is the examination of the potential for long-term perturbations, quantum shifts in trends and deviations from the traditional drivers of demand. This requires some degree of “out-of-the-box” thinking that is outside of the analytical and modeling envelope and, in some cases, such thinking will conflict with the traditional analyses.

It is because of this potential for conflict and the need for non-traditional thinking, that many organizations place the responsibility for long-term analysis in a separate unit, away from the near-term realities that must be respected in the load forecasting process. Without assigning such responsibility directly, there is the danger that the forecasting groups become too focused on their immediate deliverables and neglect the long-term possibilities. Liberty believes that this is indeed the case at CECONY and that an increased focus on the long-term is warranted.

In response to data requests, CECONY indicated that various organizations are responsible to monitor developments, but in each case the focus was short-term in nature. The Company acknowledges that:

There is no one organization within the Company that monitors all potential major developments influencing demand for electric, gas, and steam as they take shape over a period of time.

The description of the R&D group (at the same reference) suggests that they do indeed assess new technologies that could have an influence on demand. Examples cited are improved electric heating options, electric vehicles and energy storage. But there appears to be no linkage between R&D and load forecasting and such considerations do not seem to find their way into the planning process. Similarly, internal studies or EPRI results can be available, but no linkage to load forecasts exists.

Although Liberty sees this as a gap in the load forecasting process, perhaps it is more appropriately characterized as another inevitable outcome of the long-term planning deficiencies discussed at great length elsewhere in this report. The many planning barriers and restraints that we have described make it difficult or impossible to effectively cope with long-term issues;

therefore, it is somewhat natural that load forecasting, like the rest of the Company, tends to focus on the near-term and the mechanical. As a result, there is some justification for the status quo: *why spend effort on analyses that cannot be effectively applied in any event?* A solution to the corporate planning problems may therefore be a prerequisite to positive change in the load forecasting outlook.

c. Customer Migration

The load served by competitive suppliers is relatively high in New York, with about 50 percent of CECONY's delivered MW provided by others. The next figure illustrates how the Company's estimation of this number has evolved in recent years.

For purposes of this audit, migration is not a factor of concern, since we are focused primarily on the load forecasting impacts on the T&D system, which obviously includes all load, regardless of whether the energy is provided by CECONY. The degree of migration does impact other load forecasting needs, such as supply planning and rates.

Customer migration is estimated by Retail Choice Operations on an annual basis and the data is included in the 10 year peak demand forecast and, after adjustment by load factor, in the GWh usage projections prepared by R&VF.

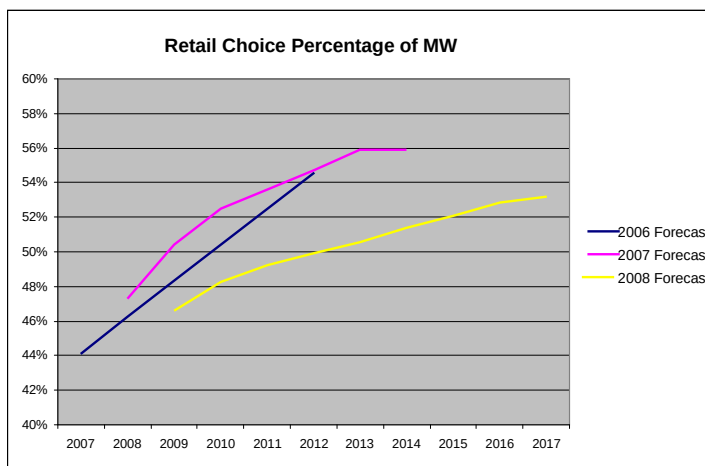


Figure VII-12

Source: DR# 970

In the gas business, third-party suppliers account for about 38 percent of the peak load and about 38 percent of annual firm throughput. Customer migration to alternative suppliers has not made much difference to the capacity planners; however, as the NYPSC has fairly recently decided that the distribution companies should be responsible for acquiring all delivery capacity upstream of the Company's city gates. The distributors then assign capacity to suppliers in proportion to their contracted on-system loads. Downstream of the gate stations, total throughput is the parameter of interest, as well. The sales/transportation split is important for determining how much commodity to buy, however, and Gas Supply looks to Retail Choice Operations for estimates of the split.

6. Integration of forecast results with corporate processes

Liberty has examined the degree to which load forecasts align with other related corporate and regulatory processes. We specifically evaluated:

- Load forecasts in the rate process
- Forecasts and corporate long-term plans
- Forecasts and budgets.

a. Load forecasts in the rate process

The principal group providing forecast input for electric rate cases is the R&VF Department. Their volume forecasts contribute to the determination of rate relief needed, if any. The peak load forecast prepared by DF also has rate case significance since it is the basis for load relief plans that drive the capital budget.

The forecasts used in the rate cases are not identical to the internal forecasts and, in some cases, may not be consistent. Internal electric forecasts are prepared in the fall, after the summer experience is available. Electric rate case submittals have been prepared in the spring. The forecasts associated with the rate cases are six months fresher and incorporate the most recent historical data, the updated econometric model and updated assumptions.

An examination of the differences in the 2007 budget and rate submittals shows the near-term forecasts were close, with any divergence growing with time. The energy forecast differed by 0 to 2 percent over the five-year forecast while the demand forecast varied by 1 to 4 percent. In both cases the rate case forecast was lower than the budget.

For gas and steam filings, the forecasts included in rate submittals may or may not agree with the forecasts used internally. These filings are generally filed in mid to late October. However, because of the lead times involved in the review process, actual or projected information included in the forecasts are cut off as of the end of June/beginning of July. The internal forecasts permit the potential inclusion, if significant, of information through the end of the third quarter of the year.

b. Forecasts and corporate long-term plans

Liberty believes that short-term forecasts and resulting decisions should always be interpreted and implemented within the context of a longer-term vision or plan. This approach assures that the organization “keeps its eye on the ball,” and does not permit short-term considerations to sidetrack long-term goals. In the event short-term realities overwhelm long-term goals, then it is necessary to revisit those long-term goals; however, in no case should short-term thinking result in ignoring the long-term vision.

One can consider this question on three levels for purposes of this audit: first, the consistency of short- and long-term load forecasts; second, the consistency of the resulting short- and long-term load-relief plans; and third, the consistency of such plans with long-term corporate goals and plans. There seems little question that the short- and long-term load forecasts are consistent. They are compiled by the same people, use the same assumptions and have generally the same users. Further, as noted earlier in a critical vein, the forecasts do not have a great deal of long-term thinking embedded in them, making it likely that they are very consistent, perhaps inappropriately so, with the near-term forecasts.

The second test involves the application of the forecast and the system planners have no option but to consider load-relief options within a long-term context.

The third test, consistency with long-term corporate goals, is a more difficult question and is yet another side of the same coin discussed earlier in the corporate-planning analysis. We have observed that there is no well-defined linkage between (a) the load-relief projects and the overall construction program, and (b) any widely understood corporate goals, performance objectives or vision of what the system and its reliability levels will look like in the long term. This disconnect makes any discussion of load forecasts and their relationship to long-term corporate plans impossible. In such an environment, the impact of the load forecast on any plans is not clear, nor is the relevance of its consistency with long-term assumptions. Since there is no “formula” or correlation between the two, such questions are unanswerable.

However this issue is not one of load forecasting; rather, it is another symptom of the broader planning issue addressed in an earlier chapter of this report. We can conclude that, within CECONY’s current framework, the load forecasts are consistently applied in the short and long term, and are consistent with long- and short-term load-relief plans.

c. Forecasts and budgets

Revenue forecasts are an essential input to the operating budget and demand forecasts form the basis for load-relief plans and hence the capital budget. It is this latter linkage to the capital budget that takes on the greatest importance for the load-forecasting considerations of this audit.

The primary forecasting products for capital-budget purposes are the ten-year independent and the ten-year coincident summer peak load forecasts, both of which are prepared by Demand Forecasting, and both of which are used by Area Station Planning and others. The flow of forecast information and resulting load-relief efforts are summarized as follows:

Ten-Year Individual and Coincident Peak Load Forecasts	
Organization	Program
Area Station Planning	Substation and sub-transmission feeder load relief
Transmission Planning	Transmission (load pocket) load relief
Electric Operations Regions	Distribution demand relief requirements
Central Operations	Substation and sub-transmission feeder load relief projects
Area Station Planning	Substation coincident load tables
System Operations and Transmission Planning	Summer load flow analysis Transmission reinforcements
Area Station Planning	4 kV load relief
Distribution Engineering and Electric Operations Regions	4 kV substation reinforcements
Area Station Planning	Distribution feeder two-year load relief

The summary demonstrates the many programs and organizations that are fed directly from the peak load forecasts starting with the chain through Demand Forecasting and Area Station Planning.

For the GBU, load forecasts drive capacity planning, both upstream and downstream of gate stations. We noted that, although R&VF’s principal product is a five-year forecast, Gas Supply

requires a 10-year forecast. The reason for this requirement is that projects to bring additional capacity to the Company's city gates have quite long lead times. The Company may well have to commit to a supply project five years before deliveries on the new capacity begin. Thus, Gas Supply wants to know more than five years in advance whether it requires additional capacity in order that it has enough time to work with project developers to configure projects that meet the Company's requirements.

Planners for ConEd's own transmission and distribution systems request a 20-year forecast. They use this forecast to configure and prioritize improvements to the Company's systems that are intended to bring their performance in line with the Company's objectives. To the extent that long-term forecasts are wrong, system-improvement priorities might change, or some might not be justified. Lead times for these projects are not as long as the ones upstream of the gate stations, however, so inaccurate forecasts are less consequential.

C. Conclusions

Organization and Capabilities

1. The personnel assigned to key forecasting roles are well-qualified, and have appropriate work experience and exceptional educational backgrounds.

Key forecasting personnel reside in the Demand Forecasting Section and Revenue and Volume Forecasting Department. In both cases, the groups are populated with individuals with appropriate utility, economics and statistics backgrounds. Most have advanced degrees. The overall level of sophistication is above average for the utility industry.

2. Total staffing levels in the key forecasting functions are adequate, although there may be opportunity to reallocate staff among load forecasting tasks and products. *(Recommendation 1)*

Certain forecasting tasks may be overdone, while others should be increased. For example, the degree of effort in the profiling of short-term residential load may fit the former category while a broader look at long-term trends may fit the latter.

The fundamental question here is the degree to which the resources applied to various load forecasting products are compatible with the business needs of those products. Supporting questions include:

- Is a high level of effort and sophistication needed to prepare a forecast that is unlikely to deviate by more than a percent or two under any circumstances?
- Are broad based studies and surveys required in the residential forecasting process if a similar quality result could be obtained via load research data?
- Are extensive multiple approaches necessary if a forecast is primarily driven by only one meaningful parameter, such as new business?

Liberty found too much effort in some areas and too little in others, and an objective review of the resources applied versus business needs and benefits will result in a reallocation of resources for the better.

3. The load forecasting functions are independent and free from inappropriate influences in the conduct of their work.

Load forecasts drive a number of important business parameters, not the least of which are financial reporting and rate needs. With respect to the construction program, load forecasts directly impact capital spending. It is therefore not unusual for the load forecasting process in many utilities to be susceptible to a certain degree of pressure, particularly if the decisions forced by new load forecasts are uncomfortable for the Company.

Liberty saw no evidence of such pressures at CECONY. Each organization associated with the process feels that they are independent and that their results flow directly from their analyses and not from suggestions or other undue influences by others.

4. The current organizational structure adequately meets the Company's needs in an efficient way.

5. Although the key load and energy forecasting functions reside in different departments, the activities are well-coordinated and suitably integrated.

6. Load forecasts and supporting data are adequately communicated so as to assure consistent use and understanding.

Liberty would normally recommend an integrated organization for load forecasting, with each commodity represented and each parameter (peak demand and volume) managed together. This is not the case at CECONY. Liberty recognizes that the burden is on the auditor to show why an alternate approach is preferable and we are not inclined to advance an alternate. Our reluctance to challenge the present organization is based on the following realities:

- The present structure is working – the various organizations are well coordinated.
- There is no indication that any inefficiencies are stemming from the current arrangement.
- The Company has experience with more integrated organizations in load forecasting and has opted for the current arrangement as an improvement.
- The two main functions in separate organizations add a check and balance for the benefit of the integrity of the program.
- The large diversity in the demands placed on the groups makes multiple organizations more attractive.

Forecasts are adequate for users' needs, although documentation of supporting criteria and assumptions could be improved. Organizations receiving forecast inputs are aware of the quality and any limitations of the information. Feedback is solicited to assure appropriate use of the data.

Models, Methods and Data

7. CECONY's fundamental approach to load forecasting, which features multiple approaches to developing electric peak demands, is sound, and includes quality inputs and tools.

The Company does not place over-reliance on any of its tools or methods but rather employs multiple analyses that produce a more credible result. Further, each of these multiple inputs has

its own well-defined process, lending confidence that the overall process is of high quality and highly credible.

8. Peak-load forecasting for gas needs a different approach. (Recommendation 2)

The problem is growth in the peak. That growth is estimated by deriving use factors from the volume forecast, then using those factors to escalate the base-year peak. That approach implicitly adopts the incremental growth rates that are in the throughput-volume forecasts, which are too high, in our view. (See discussion below.) Even if the volume forecasts were not too high, however, forecasting growth in the peak should be independent of the volume forecasts, so that the two sets of forecasts might serve to cross-check each other.

9. Throughput-volume forecasts for gas display problematic results. (Recommendation 3)

Liberty asked R&VF to compare its forecasts for the next five years to actual throughput, adjusted to the same weather assumption as the forecasts, for the last five. With a couple of explainable exceptions,⁷ the growth rates projected for firm sales for the next five years are higher than experienced for the last five. This result appears anomalous.

10. The models employed by the Company in its electric load forecasting activities are sound, tested, and effective in their intended use.

The principal model is the econometric forecasting model that is used by R&VF for the determination of commercial volumes. The sophisticated model addresses all major commercial customer classes. Although we will comment later on certain assumptions in the use of the model, the basic tool meets the Company's requirements. The Company (DF) also employs a residential model. While of a different construction, this also meets its intended use, although some of the input sources (surveys) raise cost-benefit questions.

11. Models used in load forecasting are well-managed, including appropriate updating and revision as well as control of quality.

Personnel responsible for managing the models are highly experienced and maintain their proficiency.

12. The logic behind a TV of 86° is, on its own merits, sound; however, the TV criterion is best determined in concert with other reliability parameters and not simply on its own merits.

The selection of a reasonable TV should balance other reliability considerations, including existing network margins, network reliability targets and equipment design criteria. For example, if networks are currently stressed with limited margins, a higher TV may be appropriate.

CECONY has declined to entertain this suggestion and claims that such a balancing decision is not appropriate for the Load Forecasting section in that it introduces an external influence. This

⁷ The principal one of these is the SC 31 (>4DUs) class, which saw a huge increase in 2007, which we suspect is due to a large customer's decision to switch its buildings from interruptible sales to firm.

is a fair position by the Load Forecasting section as they correctly strive to retain an independent forecast; however, Liberty believes those with a broader planning charge within CECONY should nevertheless consider this suggestion.

13. The use of 25 years of sales data for forecasting the next five is not forward-looking.
(Recommendation 3)

The electric industry and energy industries in general have been through major quantum shifts in the past that have broken established trends and rewritten the rules. Such events have included oil embargos, deregulation, the emergence of a conservation ethic, the recent commodity spike and collapse, electric rate increases and other perturbations that can change historical trends, regardless of how solidly those trends may be established. The notion that the last 25 years' sales data is an appropriate base for forecasting the next five is therefore troubling.

R&VF uses an industry-standard econometric analysis package for its forecasts of electricity sales. Forecasts are prepared separately for each customer class, which reflects industry best practice, in our view. The analysis to develop its forecasting equations uses 25 years of quarterly sales data, however, which is too long.

The nature of the analysis produces, for each customer class, a forecasting equation, composed of a constant term, plus coefficients for each of the "driver" variables. Driver variables are identified by tests of statistical significance. Using 25 years of data to perform these calculations produces both a constant term and coefficients that obscure recent developments. CECONY correctly observes that the electric models include ARIMA terms (autoregressive integrated moving average) which do indeed consider more recent developments. The degree of such contribution was not quantified (e.g., DR913), however, so that the real impact is not clear. Liberty continues to believe that the substance of the conclusion is valid.

For example, the constant term in the forecasting equations is effectively a basic, underlying growth rate, which is then adjusted by the driver variables times their respective coefficients. For the residential class (SC1), R&VF's use of 25 years of sales data for these calculations produces a constant term of about 1.2, reflecting an underlying growth rate of 1.2 percent per year. While that rate might be correct for the last 25 years, we suspect that it will turn out to be quite high for the next five.

14. CECONY's long-term forecasts prepared 5 and 10 years ago demonstrate a consistent pattern of a 5 percent to 10 percent under-estimation of peak load, calling into question the degree of under-estimation in current forecasts. *(Recommendation 3, 4)*

Variations over extended timeframes will generally have little significance and efforts to address judgments made 10 years ago are obviously inapt. Nevertheless, the consistent pattern exhibited by the long-term data is nonetheless troubling. Liberty has seen no data that suggests that the underlying bias towards under-estimation has been identified, analyzed and corrected.

15. The limited variability of annual forecast data, and the consistent outcomes of longer-term forecasts, beg the question of what level of effort and sophistication is justified for them.

Liberty has recommended a reassessment of resources applied to various products, and the accuracy data should support that effort. Given that it is difficult for annual forecasts to deviate much due to the stable nature of CECONY's load growth patterns, and that such lack of variance is borne out by 20 years of data, one can logically question the value of heroic efforts to produce highly accurate year-ahead results. This is not to suggest that a "back of the envelope" approach makes more sense, but it does suggest that the effort should be balanced with the needs, precisely as suggested in Recommendation #1.

16. The application of quantitative KPIs to load forecasting is of limited effectiveness and should not be a source of significant unnecessary effort.

Although Liberty questions the value of the existing KPIs, we also recognize that the work does not lend itself easily to such quantitative measures. The reliance on less quantitative goals, such as R&VF's schedule commitments, is a logical fallback. We have not suggested any changes in load forecasting KPIs but simply caution that KPIs requiring a great deal of time and effort are probably not appropriate for load forecasting tasks.

17. The preparation of load forecasting manuals is a positive step that should pay dividends in process understanding and improvement, clarification of roles and responsibilities, training for employees and communications with stakeholders.

Although the development of manuals is a work-in-process, the effort and resulting products are of considerable value. The scope being covered appears adequate.

18. CECONY performs little or no sensitivity analyses, probabilistic assessments or other consideration of uncertainty in load forecasting. (Recommendation 5)

In response to specific questions from users, load forecasting functions have considered some basic and limited elements of sensitivity analysis associated with forecasts. This has been at a minimal level and has been unstructured and irregular.

The Liberty evaluation criteria suggest that "Models should have capabilities suitable for analysis of uncertainty, such as probabilistic and sensitivity analysis". Utilization of such tools should be considered an essential part of any planning process.

Criteria and Assumptions

19. Documentation and communication regarding the criteria and assumptions used in load forecasts and the factors that drive forecasts can be improved. (Recommendation 6)

The eventual test of forecast quality and the degree of credibility a forecast has flows from a set of rational assumptions. Further, the only meaningful participation management can have in the process flows from a discussion of those assumptions. And the confidence of users and their willingness to apply forecast data as intended is also a function of their understanding of the basic drivers. It is therefore important that forecasts be documented in a way that effectively communicates the results and allows stakeholders the opportunity to discuss the basis for, and impact of, assumptions.

It is wrong to conclude that such documentation is completely lacking at CECONY. But what exists is fragmented and not packaged in a way to advance the suggested objectives of: (a) effective communication, (b) discussion and testing of the assumptions and (c) documentation of the final product.

20. The methods, inputs and assumptions that drive load forecasts are generally consistent across organizations and across the three commodities.

Liberty interviewed many individuals in the load forecasting and user groups and received a consistent story. This suggests that consistent practices are in place and that there is a general understanding on how things come together. This consistency applies to electric, gas and steam as well. Although the details may vary among commodities, the same basic principles appear to be in place.

21. CECONY has an effective regional presence for the gathering of economic intelligence and does a good job of incorporating such intelligence into the load forecasting processes.

The steps CECONY has in place to garner information on a local and regional level are very strong. Relationships with business groups and others are good and the Company obviously sees this source as a priority.

22. CECONY meets all NYISO requirements for the submittal of load forecasting information.

NYISO requirements are defined in their manuals, which specifically list the data that load serving companies must provide. CECONY is in compliance with all of those requirements.

Forecast Details

23. The Company prepares forecasts at a level of detail consistent with product and user needs.

Each organization responsible for load forecasts provides suitable levels of detail, whether by class, network, time or other required parameter.

24. The process for forecasting network loads is sound and effectively incorporates relevant drivers of network load.

The principle input for network forecasts is new construction and CECONY does an especially good job of identifying and monitoring those inputs. Other details (such as DSM) are considered as available at a network level.

25. The Company's process of identifying and tracking new construction, and integrating that information into long-term network load forecasts, is extensive, efficient and effective.

The system of identifying new loads, cataloging them with supporting details in CORS, monitoring progress and schedule changes, and folding associated loads into forecasts involves hundreds of projects and is a reliable, orderly source of important information.

26. CECONY load forecasting processes make no use of CECONY load research data, suggesting a lost opportunity for potentially significant improvements in quality and cost effectiveness. (Recommendation 7)

The wealth of data available from more than a thousand interval meters should provide valuable insights into trends, customer behaviors, appliance utilization, and other factors critical to successful load forecasting.

Major influencing programs, events and eventualities

27. CECONY's energy efficiency goals are reflected in load forecasts on a network-specific basis where possible and otherwise pro-rated to the networks.

There is a limited ability to accurately assign DSM benefits to individual networks. Only one element of the Company's energy efficiency initiatives is able to be targeted to specific networks and the potential savings attributable to that one element are rather small. The process to assign DSM savings to networks is nonetheless in place and will serve to facilitate DSM benefits if the targeted benefits initiatives become more effective.

28. Goals for DSM targeted to specific networks represent a small percentage of the system peak demand. (Recommendation 8)

While all DSM has value, that targeted to specific networks is "gilt edged" for purposes of the construction program. Unfortunately, the portion of the program that yields such targeted benefits is small, suggesting that there may be an attractive payback for efforts to enhance that percentage.

29. CECONY's load relief program and resulting construction needs receive no benefit from the Company's load curtailment programs. (Recommendation 9)

The potential benefits of targeted DSM accumulate to less than 1 percent of system peak over an extended period. Further, there are no benefits to the distribution system or the capital budget from previously established curtailment tariffs.

It is recognized that the recent New York efficiency initiatives are still in the early stages. With further experience and awareness of the potentially high paybacks, targets and actual achievements may increase. In the meantime, there is considerable incentive for the Company to be aggressive in (a) energy efficiency measures that reduce long-term load overall, (b) targeted DSM and (c) other efficiency measures that can be assigned at a network level, such as mandatory curtailment programs.

30. CECONY's load forecasting efforts are focused on history, short-term events and mechanical processes with insufficient attention to long-term considerations that might have a quantum impact on demand. (Recommendation 10)

There are several elements to this conclusion, all of which involve a way of thinking or a perspective on load forecasting. Liberty believes the Company's way of thinking, and how it generally views the forecasting challenge, tends to unduly constrain the process. This in turn limits the ability of analysts to extract the best information from the process.

The most important element relates to long-term considerations that might represent significant changes in the direction of the industry. The notion of significant changes in the industry that can have a quantum impact on load trends is a hard sell in a long-established company in a long-established industry. But CECONY is obligated to be prepared for the future, and approaches that do not adequately consider significant exposure to change should not be considered acceptable.

31. CECONY prepares estimates of customer migration and incorporates them in the 10 year forecasts as appropriate.

Although not significant for the capital budget, migration forecasts are important for other purposes. CECONY prepares a long-term migration forecast and updates it annually.

Integration of forecast results with corporate processes

32. CECONY load forecasts used for rate filings are prepared consistently with those prepared for budget purposes but may differ due to timing.

Ideally, rate case forecasts and budget forecasts will align; however, the respective cycles are out-of-phase creating natural differences. In the single case examined by Liberty, the differences were not significant for the first forecast year but grew with time.

33. Peak load forecasts are effectively used in the budgeting process, directly leading to load relief programs in the capital budget.

34. Revenue forecasts are effectively used in the operating budget process.

The linkages between load forecasts and the capital and operating budgets are literal. There is no indication that the Company uses different forecasts for different purposes.

D. Recommendations

Organization and Capabilities

1. Analyze, and redirect as appropriate, the level of effort and sophistication applied to various load forecasting tasks and products, to better balance costs with product and user needs. (Conclusion 2)

The Company believes such an exercise will prove cost beneficial and has suggested that it would be appropriate “to undertake a review of the tasks used by the organizations that produce the load forecasts for electricity, gas and steam to identify possible efficiency improvements and opportunities to reallocate resources to address additional processes.”

The Company’s suggested approach contains several sound ideas. They propose to initiate a benchmarking process in search of best practices from other utilities. They intend to work with internal customers to assure that forecast products meet user needs on an optimum, cost effective basis. And they plan to link their forecasting outputs to enhanced corporate planning initiatives. CECONY’s identification of such features raises the confidence that this recommendation can be implemented effectively.

Liberty has noted that CECONY personnel assigned to load forecasting have above-average capabilities. The Company has done a good job of building a skilled organization with strong tools. It is nonetheless important that one or more outsiders participate actively in this improvement initiative. The team initially assigned by the Company for this work does indeed have such outsiders and their role to facilitate broader thinking, stimulate change and bring new ideas should be emphasized.

Liberty recommends that the implementation team examine each major task in the forecasting process. The nature of the process is such that methods often evolve and grow with time and improvements are usually incremental. The question of whether the basic method still makes sense is rarely considered. That opportunity exists today and should be taken.

We would particularly suggest that the collection and analysis of residential load data and its eventual use should be examined closely. There may be real opportunities for improving the quality of the information as well as its responsiveness to other business needs. Integration of this effort with the load research program in Rate Engineering has the potential to offer excellent technical and economic benefits.

Models, Methods and Data

2. Find a better way to forecast growth in the peak gas load. (Conclusion 8)

There are broadly two sets of alternatives for this in practice today: “structural” approaches and “econometric” ones.⁸ DF uses a structural approach for forecasting the electric peak; it builds up a growth rate for each sector⁹ through measurements of factors thought to affect growth rates in each: national economic growth, private non-manufacturing employment, etc.

The econometric approach uses analysis of customer billing data to develop estimates of use per customer for each customer class. Peak demand is estimated by multiplying use per customer on the peak day by the number of customers on that day in each class. Econometric analysis of the relationship between “driver” variables like economic growth, private non-manufacturing employment, etc., is often used in forecasting the number of customers.

Each of the two approaches has passionate adherents. We recommend that DF explore both preliminarily, then select the one that fits its preferences and capabilities. As noted, DF uses a structural approach for forecasting the electric peak.

Both approaches involve considerably more effort than the Company is currently spending on this problem. However, the current approach is producing a number that is too high, in our view. The benefit to customers of changing to what is an admittedly more expensive approach to this problem will be that forecasted growth in the peak will be less, which will reduce the Company’s

⁸ These labels can be hard to interpret because structural analysis uses a lot of econometrics, and the econometric approach uses a lot of structural observations in its analysis.

⁹ Residential, commercial and government.

need for additional gas-supply capacity in the future. Since the most-recent addition to delivery capacity cost \$700-800 per Dth/day, the savings in reduce capacity requirements should be vastly higher than the increased forecasting costs.

3. Conduct an R&VF review of certain aspects of its approach to forecasting. (Conclusions 9, 13, 14)

As noted in Conclusion 14, electricity sales forecasts have in the past proven to be too low. And as noted in Conclusions 9 and 13, future sales forecasts may be too high.

Industry best practice today involves intensive analysis of recent data, and Liberty believes an enhanced weighting of recent data should be considered. Today industry trends are indicating that the historical growth rates in electricity usage are on the decline. Conservation is beginning to have an effect, as are the dramatic increases in electricity prices that have occurred since restructuring-related price caps in many states have expired. In addition, many utilities are witnessing what they consider to be permanent dislocations in demand that are in addition to, not caused by, the current global economic problems. Careful analysis is required before disregarding what appear to be clearly defined new tendencies. These national observations may or may not apply to CECONY's future, but they should at least be examined.

This recommendation should not involve additional cost, as it requires only a review by existing staff.

4. Evaluate the factors responsible for consistently under-estimating 5 and 10 year peak load forecasts; assure that any bias is removed from future forecasts. (Conclusion 14)

The fact that 5 and 10 year forecasts have exhibited a consistent pattern towards under-estimation is not necessarily an issue, provided that suitable analysis has been done on the cause of the bias. Depending on that cause, future 5 and 10 year forecast assumptions may need to be changed.

5. Expand load forecasting activities and capabilities to encompass analysis of uncertainties using sensitivity analyses, probabilistic tools or other applicable techniques. (Conclusion 18)

CECONY has recognized this need and is pursuing appropriate actions. The Company intends to "work with our internal customers to provide a variety of scenarios or sensitivity analyses of future customer demands and volumetric usage to support efforts to develop longer term business plans."

Embedded in this recommendation is the need to think outside the narrow few-percent wide envelope that now characterizes load forecasts. "What if" studies are particularly important at this time as some utilities are experiencing quantum changes in their demand outlook.

Criteria and Assumptions

6. Develop an improved approach to the documentation, testing, and communication of forecast criteria and assumptions. (Conclusion 19)

A number of criteria are suggested for this improved approach. First, containing the basis for all current forecast data in a single document will assist all users and will facilitate a greater understanding of the assumptions as well as assuring consistent application. Organization of such a document, updated as necessary as assumptions change, should not be difficult and should simply entail compiling and integrating already-existing data.

Second, the data should be available in summary forms that allow stakeholders, including management, to understand the assumptions, including the impact of those assumptions on the forecast results. A simplified presentation of how assumptions build to produce a forecast outcome, and the degree of contribution by each assumption, is critical to management understanding.

Third, the data should be in a form that facilitates a testing process by interested stakeholders and managers. Assumptions need to be ventilated and subjected to discussion in order to produce a rational outcome, general consensus and optimum quality.

Fourth, assumptions and criteria are defined in this recommendation as important judgments that tend to drive the forecast results. For example, a critical assumption might be:

“The base underlying growth rate of electric sales is assumed to be the same as the 25 year average”.

Such an assumption drives results but may not be a generally accepted premise. It therefore needs to be ventilated at the appropriate levels.

Forecast Details

7. Examine and implement as appropriate the efficiencies and quality improvements that might result from utilization of CECONY’s load research program, modified as cost-effective, to support load forecasting. (Conclusion 26)

It is recognized that load research is not cheap and that modifications to the existing program might be necessary to facilitate its use for load forecasting. Once the load forecasting needs have been defined, it should be straightforward to estimate the added costs to the load research program and determine if the benefits are worth the cost.

In many cases, we would assume that valuable data already exists. For example, hourly use data for residential customers should answer some of the very same questions now posed via surveys, such as the afternoon times that air conditioning load is added and the degree of saturation that exists with respect to air conditioning load.

Major influencing programs, events and eventualities

8. Aggressively move forward with the major study planned by Market Research on efficiency potentials and include a special focus on efficiencies that can be targeted to specific networks. (Conclusion 28)

9. Evaluate options to enable the consideration of current and future load curtailment initiatives, both at CECONY and NYISO, for dependable network demand reduction.
(Conclusion 29)

The major study by Market Research is a commitment that is already in place and should have a high priority because of its high benefit-to-cost potential. Load curtailment may be a significant potential to include in that study.

Liberty recognizes the major implementation problems that accompany electric interruptible load programs. The programs are invariably high cost, an administrative burden, difficult to police, politically dangerous and often are not as reliable as hoped. One must therefore weigh the costs and benefits carefully.

But many of the negative attributes of interruptible load might not apply here since the programs are already in place at the NYISO level. The challenge then is not to overcome the many restraints listed above, but rather to allow the distribution company to capture the system-wide benefits of interruptible load at the network level.

10. Establish a structured approach to the consideration of long-term eventualities that might significantly impact load forecasts, such as changes in trends, new technologies and new policies. *(Conclusion 30)*

While various organizations within the Company study and track industry evolutions, including regulation, new technology and government policies, there is no structured approach to “bringing it all together” at a corporate level for planning and strategy or at lower levels for consideration in specific programs such as load forecasting.

Integration of forecast results with corporate processes

No recommendations.

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VIII. System Planning – Electric

The planning processes at CECONY are staffed by technically competent personnel and use sufficiently detailed models and software to produce accurate results in long-range planning. An exception is that short-term market alternative responses to requests for capacity proposals dictate that transmission system planning at CECONY be shorter term focused than historically performed. Lower voltage systems are not affected by market decisions as they are radial in nature, even though they are looped systems. Data is generally consistent among the organizations and known weaknesses in models or data are being addressed. Equipment ratings should be examined to assure a higher level of consistency.

CECONY is preparing for 3G¹ system applications, although full implementation may be years or decades away. System Control and Data Acquisition is being modernized and installed down to the network transformer level and poly phase models are being installed for detailed and uniform secondary system applications. The one shortcoming in the 3G effort is the lack of a plan addressing goals, expected results, and means of getting to them.

Equipment sufficiency is maintained through ongoing maintenance programs and targeted reliability programs that address specific equipment problems. Cost savings are available in the short term reliability programs.

Liberty identified several areas that need analysis. Those areas include: (a) establishing a maintenance requirement in the planning standards for 138 kV and network systems that are designed to a single contingency, (b) targeting very high losses at the time of system peak, and (c) setting a specific reliability design level for the networks. In addition, the distribution vegetation management program requires uniform direction and accountability and inspection processes need reinforcement.

A. Background

System planning ties together the changing aspects of the power system in terms of growth and topology² changes. It is the planners' responsibility to ensure that the future system will meet stated reliability benchmarks by recommending capital improvements that do so in the optimum economic manner. This chapter explores the interrelationships in the organization that accomplish those goals.

The criteria by which Liberty evaluated system planning - electric included the following:

- System planning process
 - A long-term master plan should be in place that offers a credible strategy for how the system will evolve over an extended period, including expansion requirements, aging issues, reliability goals, growth of technology and other factors important to a long-term planning horizon.

¹ Third generation power through the use of advanced based information technologies and real time data.

² An electrical circuit's topology is the form taken by the network of interconnections of the circuit components.

- Shorter term changes to the system should be compatible with the longer-term plan.
- A strategy should be in place that describes how the system will avoid over-extended lives for equipment and facilities, including an overall repair versus replace strategy.
- Standard planning parameters should be published and updated as appropriate.
- Guidelines for economic evaluations should be in place and uniformly applied.
- Policies for weighting the benefits of non-financial attributes should be in place.
- A system of prioritization of projects should be in place and uniformly applied.
- CECONY should have a system planning staff with the appropriate quantity and quality of skills.
- Major projects should be specified by planners in a way that permits their subsequent design and installation to be optimally managed.
- Standard decision-making rules for design options (overhead versus underground, etc.) should be documented.
- Planning processes, guidelines and standards should reflect regional differences where appropriate.
- A structured approach to cost benefit analysis should be in place, with specific instructions for the handling of various financial and non-financial benefits.
- Decision-making processes should consider risk, preferably in a quantitative way.
- Mechanisms should be in place to provide planners with feedback on field results that should influence future decisions.
- Technical elements of SP
 - The inputs to the planning process should be credible and in a form and content compatible with the planners' needs.
 - Ratings for equipment loading should be in place; they should reflect the operation expected and should be determined to maximize equipment use while maintaining equipment integrity.
 - Models, both static and dynamic, should be appropriate for the conditions simulated and their limitations understood by those that use them.
- New technologies
 - Suitable investments should be made in defining new technologies that can be integrated into future system design or redesign of the existing system.
 - Optimum use of present technologies and the state-of-the-art should be an appropriate part of the planning process.
 - Non-traditional and innovative options should be considered in the planning process.

B. Findings

1. System Planning Process

CECONY system planning results from four distinct processes: network planning, distribution system planning, area substation planning, and transmission planning. All system elements, excepting the transmission system are radial in nature but looped. The network systems include the multi-source grid secondary systems. The distribution system includes overhead distribution and the 4.16 kilovolt (kV) grid system. The Area Substations include the 138 kV lines that feed the 138 kV/13.8 kV, 27 kV, and 33 kV transformers and feeder positions that feed the 13.8 kV,

27 kV, and 33 kV feeders that feed the networks. The transmission system consists of the entire 345 kV transmission system and some of the 138 kV system.

Each planning process must take place under a long-term master plan that offers a credible strategy for how the system will evolve over time, including expansion requirements, aging issues, reliability goals, growth of technology, and other factors important to the planning horizon.

a. Long- and Short-Term System Plans

1. Network Planning Process

Area substations are 138/13.8 kV facilities, radial fed (but looped) from the transmission system. Typically about 20 network feeders emanate from these substations. Depending on size, it takes from 12 to 29 feeders to serve a network. Each feeder will generally serve 15 to 30 network transformers. An area substation generally feeds just one network, but can serve two in some instances. The networks, isolated pockets of load, are served by radial 13.8 kV, 27 kV, or 33 kV feeder cables that serve a multitude of network transformers. The network transformers vary in size according to the load they serve.

There are 60 major networks in total. All networks in Manhattan, Brooklyn, Queens, and the Bronx are designed for N-2 conditions (essentially the number of contingencies). 4kV grids in the Bronx, Brooklyn, and Queens are supplied by N-2 networks and are also designed to N-2 conditions. 13.8 kV or 27 kV auto loop systems in the Bronx, Brooklyn, and Queens are designed for N-1 conditions. CECONY defines an N-2 design as two feeders supplying a network or load area simultaneously out of service including associated feeders. For example, two feeders feeding the same area of the network, either in the same or different duct banks, would be classified as associated feeders. To establish feeder diversity, CECONY will not allow more than two associated feeders in the same duct bank. Because a single event can take out two associated feeders, CECONY either does not dig or hand digs only on hot days.

CECONY plans 13.8 kV, 27 kV, and 33 kV feeders using a two-year horizon; *i.e.*, in the fall of 2009, network load plans are made into 2010 and 2011. CECONY plans required network transformers using a one year horizon. Planning requires that these facilities meet the applicable “N” condition under peak loads having a one in three probability of occurrence. The New York City (NYC) multi-year street construction plan requires that CECONY install ducts when the streets are open, which may not conform precisely to the dates that Company plans indicate. CECONY’s approach is to take advantage of street openings and to install oversized duct banks. CECONY communicates weekly with the NYC Department of Transportation.

2. Distribution Planning Process

The 13.8 kV, 27 kV, and 33 kV overhead (OH) auto loop systems³ are overhead systems. CECONY plans them using a 5-year horizon and applying peak loads that have an expected

occurrence of once in three years. All of the auto loops are on System Control and Data Acquisition (SCADA). CECONY's approach is to install an auto loop system to relieve the 4.16 kV grid only where it makes sense to do so.

CECONY's 5 recloser auto loops are designed as follows. A 13.8 kV line will serve a spot network,⁴ high tension customer, or a unit substation. At some point a vacuum recloser is installed. Further down the line, a midpoint recloser is installed. From a different load bus at the same substation, a similar circuit is constructed. These two circuits are connected together with a normally open tie recloser. This creates 4 sections of line; no section can have more than 3 Mega Volt Amperes (MVA) of load. Over-current relays and loss of potential schemes are coordinated to allow any faulted line segment to be properly isolated. A 3 recloser auto loop is essentially the same, but does not have the two midpoint reclosers. In this case, a maximum load of 6 MVA is permitted.

Planning for the 4.16 kV grid systems also uses a 10-year planning horizon and applies one-in-three year peak loads. Unit substations feed the 4.16 kV grids at 33 kV/4.16 kV, 27 kV/4.16 kV or 13.8 kV/4.16 kV. The 138 kV area substations in turn feed the unit substations. Each 4.16 kV substation has four feeders that tie back to other 4.16 kV substations. CECONY seeks to continue using the 4.16 kV grid systems as long as possible because 13.8 kV grids have too much short circuit duty. If problems cannot be rectified at the 4.16 kV grid level, then an auto loop will be considered.

CECONY performs actual load flow studies (out to 5 years) for the 4.16 kV grid systems. The Company examines the 5 to 10 years window through a tabular review, complementing it with any confirmation studies deemed necessary. Specifically, CECONY compares the loads, capacitors, and known transfers (without losses) to the actual limits of the lines emanating from the area substations. When overloads are noted, new lines, load transfers, or new auto loop systems are deemed to be required. The radial nature of the 4.16 kV grid systems makes this method an efficient and accurate way to examine long-term system requirements.

Manhattan has no overhead distribution system. Staten Island and Westchester have 13.8 kV systems that feed into a 4.16 kV grid. CECONY designs them to a single contingency. The Bronx, Brooklyn, and Queens regions have 13.8 kV or 27 kV auto loop systems designed to N-1. These looped systems, as well as the network feeders that feed into 4.16 kV grids, are designed to accommodate the second contingency.

CECONY designs overhead distribution feeders to a 2-year load relief program, performing the underlying analyses by each region.

³ A 13.8 kV auto loop is a dual fed 13.8 kV circuit that is separated into quarters with mid point reclosers and limited to 12 MW of load. Each section is limited to 3 MW and through proper coordination a fault on the circuit will result in only 3 MW loss of load.

⁴ A spot network serves only one or two large customers.

3. Area Substation Planning Process

Network load forecasts and equipment ratings are input to the planning programs. Area substation and sub transmission feeder planning occurs first, so that the shifting of network load can be modeled to defer large system investments associated with area substations. Up to 6 stations are fed from a single transmission station.

CECONY performs actual network feeder load flow studies out to 10 years, again using peak loads expected to occur once in 3 years. A tabular review, supported by confirmation studies deemed necessary, covers the 10 to 30 year window, as is done for the 4.16 kV grid systems. Like those systems, the radial nature of the systems from the area substations downward makes this an effective means for determining future area substation sites and transmission routes to new or existing area substations. Network feeder planning uses a 2-year horizon (not the 10 years used for area substations), because of the rapid changes to local plans.

Capacitors connected to the area substation distribution bus provide voltage support to limit momentary voltage dips to a planned 11 percent before the transformer load tap changers move. CECONY also adds capacitors to gain transformer capacity. A typical 5-transformer area substation can gain can gain 21 Megawatts (MW) of transformer capability from the addition of three 20 MVAR capacitor banks.

4. Transmission System Planning Process

CECONY prepares a 10-year transmission plan that uses the typical 1-in-3 year peak load. The Company does no active study beyond this 10-year horizon, but looks at another ten years conceptually. CECONY expects that it will require within the next 10 years: (a) new transmission switching stations in Manhattan and Queens,⁵ and (b) transmission extension of Sprain Brook from Academy to 49th Street substations.⁶ These requirements assume that the 1,000 MW of contract power is extended.

CECONY has identified 17 load areas within its system, and studies them, using load flow, stability, and short circuit analysis as necessary. These studies *pre-stress* the system with the maximum import from upstate and a 1,000 MW import on the A, B, and C cables from the PJM system.⁷ CECONY examinations of future generation additions model no uncommitted future generation developments but consider their construction as possible options in its analysis.

CECONY designs the 138 kV transmission system to N-1 contingencies, using the North American Reliability Council (NERC) list in Table 1, contingencies a-h, to conduct tests. The

⁵ CECONY currently states that these additions are outside of the 10 year planning horizon due to reduced demand forecasts that incorporate the impacts of the economic downturn and Demand Side Management programs.

⁶ CECONY currently states that these additions can be cost effectively deferred by enhancing the ratings of feeders 45 and 46.

⁷

Company designs the 345 kV system to the full N-1-1 list of contingencies. CECONY stated that it studies open breakers or split substation ring busses when performing its contingency analyses. CECONY alternates the termination of sources and loads in its ring bus configurations. This approach significantly mitigates the impact of contingencies that involve more than one system element.

CECONY also looked at increasing the interrupting capability of 63 kA breakers to 80 kA breakers as the short circuit duty of the system increases. The 80 kA breakers do not fit in the 63 kA breaker pad locations. CECONY therefore decided instead to use series reactors to limit fault current as they represented the least impact to the operational capability of the transmission system and were more economical.

CECONY reported that the NY transmission owners have underway a 20-year transmission study, in order to determine required system improvements (including NYC) required through 2028 for reliability reasons. The NY-ISO normally conducts a 10-year analysis. CECONY is also participating with NYC in a Charles River Associates economic study of city congestion.

CECONY's use of a looped transmission system means that actions of other parties cause changes to system topology. The lead times for the changes made by others are shorter than is CECONY's time to plan in recognition of them. This phenomenon makes CECONY's long-range transmission planning reactionary and, to a large degree, conceptual. Planning becomes more dominated by the shorter time frame generation alternatives, as compared with longer time frame transmission alternatives.

For example, CECONY currently has two contracts (for 600 MW and 400 MW) terminating in 2012. CECONY is now seeking Federal Energy Regulatory Commission (FERC) approval of a 5-year extension of them. CECONY expects that FERC should decide the case in 2009 and that the appeal period will be over by 2010. CECONY has examined the consequences of a FERC failure to allow extensions. Alternative transmission reinforcements would be required and the extent of the reinforcement would depend on which contract would be extended. Loss of the 400 MW contract would require a 7-mile 345 kV line extension from Academy substation to the 49th Street substation, at a cost of \$250 to \$300 million. Losing both contracts would require additional significant (but unidentified) additions after 2012. CECONY stated that even if the contracts are not rolled over, the line will still be in place providing some benefit through contracting not yet developed.

Moreover, Market Requests for Proposals (RFPs) are presenting short-term complications for long-range transmission-system planning. The New York Power Authority (NYPA) desires to build: (a) a 7-mile HVAC tie to New Jersey (NJ) from 49th Street, and (b) a back-to-back 600 MW DC tie in NJ. This plan would require doubling the size of the 49th Street substation. PJM previously identified \$550 million (recently revised downward to \$300 million) in transmission upgrades to its system to pull the 600 MW through the Pennsylvania New Jersey Maryland (PJM) Independent System Operator (ISO). Public Service Electric and Gas is looking at isolating generation to NYC at 49th Street as an alternative, with an in-service date by the summer of 2011. This alternative would still have impacts on PJM, requiring upgrades as generation is lost within the PJM area. A decision is reportedly due by February 2009.

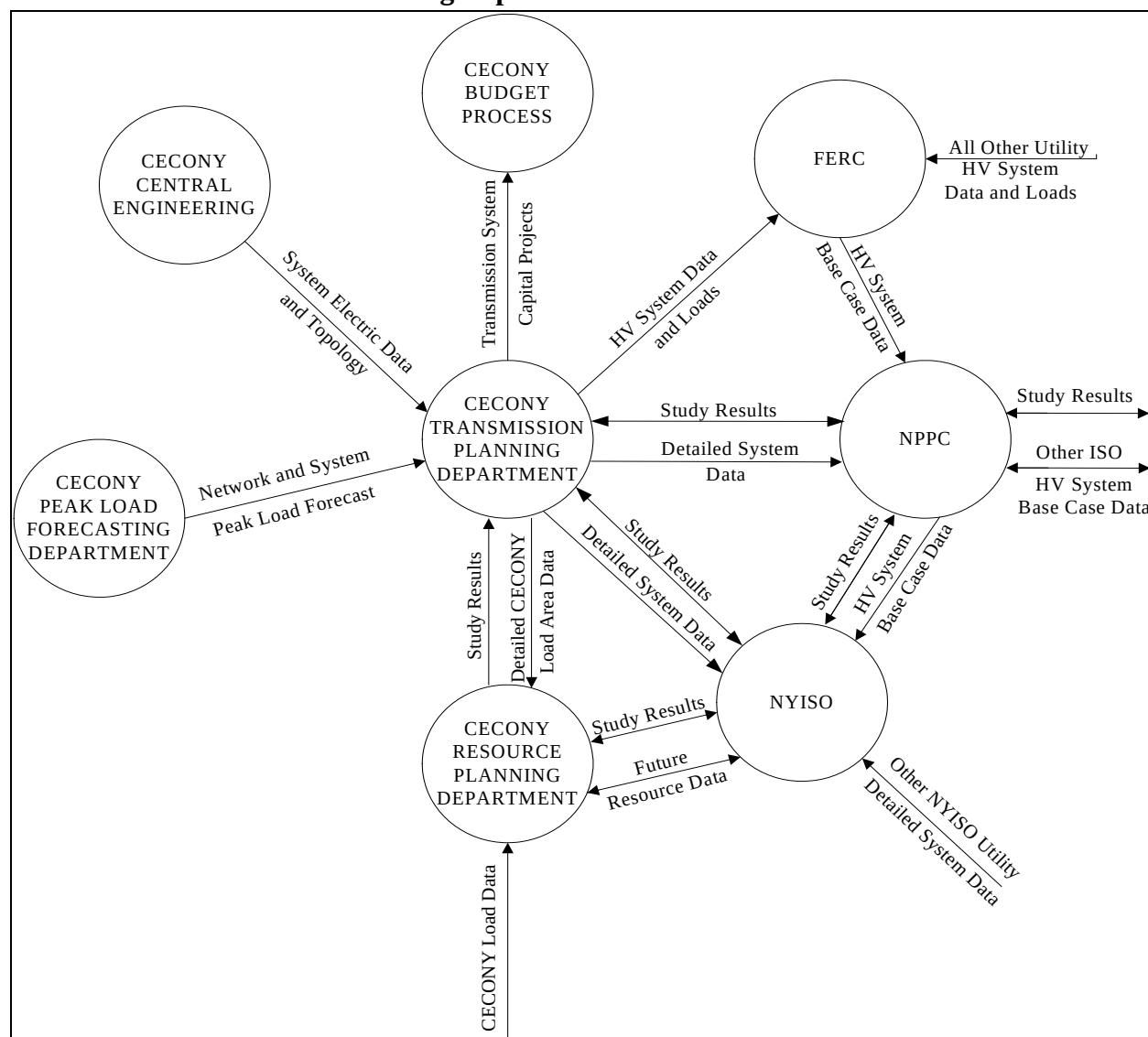
There is also an RFP that may include the construction of Astoria Energy #2. This expansion would add 550 MW by the summer of 2011. Complicating consideration of these projects is the uncertainty caused by the annual changes in amount and success of demand side management programs.

Altogether, this wide variety of alternatives increases the complexity of decisions to commit large amounts of capital for transmission projects that have lead times exceeding those of the potential projects that can have a profound impact on the benefits that new transmission can be expected to produce. Simply put, it is very risky to commence construction of a \$300 million dollar transmission project that may take 5 or 7 years to complete when a subsequently-announced generation by a competitive-market participant can be completed in 2 or 3 years.

CECONY stated that it undertakes a loss-of-gas-supply study each year to verify that loss of a major element in the gas system does not interfere with continuous operation of system generators.

The following diagram below depicts both the internal and external interactions that take place within the Transmission Planning Department.

Transmission Planning Department Process and Interaction Flows



b. Strategy for Avoidance of Over-Extended Equipment Lives

i. Aging Infrastructure and Problematic Equipment

CECONY, along with most others in the industry, has problems with aging equipment and specific models of equipment that suffers from systemic design deficiencies. CECONY's objective is to minimize the amount of equipment that is out of service for repairs or replacement. The objective is accomplished by regular maintenance practices and by tracking specific equipment problems on an individual basis and the generalized tracking of outaged equipment. The most prevalent equipment problem on the CECONY system is with higher voltage breakers. As described directly below, virtually every circuit breaker design has encountered either design or maintenance issues.

GE manufactured ATB 345 kV breakers in the 1960s. This equipment suffers from design problems and replacement part procurement difficulty. CECONY had at one time approximately 39 of these breakers on the system; 2 or 3 remain. CECONY has decided to replace them by 2009.⁸ The Westinghouse SF1380 SF₆ double pressure 40kA breakers also suffer from systemic problems. They remain operationally fit for duty, but are very costly and time consuming to maintain. CECONY began about 10 years ago a program to replace all of these breakers. Difficulty in maintaining these breakers led CECONY to decide not to use available duty-upgrade kits to increase their capacity to 54kA. The Company instead will replace each breaker when maintenance comes due. Approximately half of the original 45 breakers have been replaced as growth-induced breaker duty requirements and system topology have changed. CECONY plans to remove the remainder in 5 years as part of its 15-year breaker overhaul cycle. Other breaker replacements take place on a spot basis as problems arise.

Another source of repeat equipment troubles involves the ITE 345 kV and 138 kV disconnect switches, which have shown a tendency to develop hot spots. CECONY thermographs each disconnect each time it operates, in order to verify cool connection and functionality. The easily-broken nature of CECONY's #4 and #6 self supporting copper wire has also been a source of problems in the overhead distribution system. CECONY anticipated that addressing this problem area would require a 10-year program.

Lead and oil have presented CECONY with challenges as well. The Company decided to remove them from its system in the 1980s. The paper insulated lead cable (PILC) removal program calls for total elimination from the system by 2020. Joints used with the PILC cable have also proven to be problematic. The Company has removed 5,000 of these Elastomold Y joints; there remain 400 to 600 of them, with the last scheduled to be removed by the end of 2008. The 20,000 Raychem 1 way-3 way joints existing on the system in the late 1990s have also caused problems. Approximately 10,000 remain; they will be all replaced by 2020. CECONY stated that the Long Island City network will be free of these joints by 2012 as part of a targeted network reliability improvement program in that portion of its system.

Corrosion on the more than 25,000 500 and 1,000 KVA network transformers has also caused problems, resulting in about 150 failures per year. In 2005, CECONY started a 5-year program to monitor all network transformers and to perform Dissolved Gas Analysis testing. CECONY reports a reduction in network transformer failure rate to about 25 per year currently.

CECONY also noted safety and environmental issues with the 4.16 kV ESCO single phase oil filled load break switches.

Secondary mains have experienced problems related to age and salt contamination. The system includes 66,000 miles of secondary cable including 48,000 miles of secondary mains. CECONY is inspecting every manhole and service box to determine the extent of contamination at each location. CECONY reported testing of a system that evaluates secondary mains for replacement.

⁸ CECONY states that all breakers were replaced by the end of 2008.

Underground Residential Direct buried cable is failing, as it is on every system in the country. This cable was manufactured in the 1960s and 1970s. Primary direct buried cable is being replaced on a targeted basis.

CECONY is focusing on a number of equipment-replacement programs. An example is the removal of the Raychem problem joints in the Long Island City network by 2012. The underlying goal of the program is to remove all Raychem joints from the system (even from the networks where reliability far exceeds the established reliability goal of one failure in 1,000 years). Budgets formulated across all regions apply that goal. As a result, reliability improvement decreases for each unit replacement in the networks that enjoy much higher inherent reliability levels.

CECONY will also replace all of the PILC oil filled cable on its system by 2024. That program also eliminates temperature sensitive stop joints (transition joints from oil cable to cross link polyurethane material). The Raychem joints display a constant cost of replacement. That is not the case for PILC cables (increasingly more expensive as costs are directly proportional to the number of cable sections being replaced). For example, the replacement of a single PILC cable section removes two stop joints as does the replacement of a 10 section cable at 10 times the cost.

Ongoing maintenance keeps equipment in good working order and identifies individual or generic equipment problems prior their becoming severe. CECONY has many ongoing maintenance programs. CECONY maintains three data bases to track equipment outages. First, the “Banks Off” data base tracks network transformers and network protectors that are out of service. Second, the “Open Mains” data base tracks open secondary mains. Third, the “Distribution Fault Tracking” data base tracks abnormal conditions that are presumed to be an indication of an impending fault. The populations in these data bases are 1.4 percent, 0.2 percent, and 0.09 percent respectively. CECONY engineering operating procedure EOP-5036 (Guidelines for Recording Open Mains and Banks Off) and specification EO-1184 (Identifying Cable and Splice Abnormalities on Distribution Feeders) detail how this information is tracked.

CECONY has the following ongoing maintenance programs:

- Spring Hipot – Hipot testing of feeder cables prior to summer peak
- Hipot After Failure – Feeders are hipoted after operating or test failures
- Oil Minders – Detection and alarm of oil in vaults
- Vented Manhole Cover Program – Replacement of manhole covers with vented covers
- UG Secondary Reliability Program – Upgrade secondary systems so that age is a maximum of 45 years
- Remote Monitoring of Network Transformers – 25,000 transformers monitored for load and status are being upgraded for real time transformer information
- Osmose – Pole treatment to extend service life
- Inspection of Network Distribution Equipment – (CINDE) 5-year inspection program
- DGOA Program – Testing for dissolved gas in transformers
- Anode Installation – Installation of anodes on transformers to prevent corrosion
- Vault Flushing – 5-year program to clear vault drains and sump pumps

- Inspection Program – New York Public Service Commission (NYPSC) ordered 5-year inspection program.

ii. Current Planning Standards Meeting Long-Term System Needs

As stated above, CECONY designs its system to a variety of standards. Simply stated, portions of the system are designed to an N-1 or a single contingency standard and other areas are designed to withstand a double or two contingencies which are referred to as N-2 or N-1-1 designs. Design criteria differ according to the importance of the system considered. CECONY provided information showing that the number of networks that would be above 90 percent and 95 percent of their emergency capability under contingency conditions was increasing with time. This trend signifies that CECONY is extracting maximum use from existing facilities, thus minimizing additions.

In the short run, this approach reduces cost. However, the closer systems run to their capabilities, the more difficult it can become to perform maintenance activities that require the removal of a system element from service. Companies plan maintenance at lower load levels to minimize the potential for disruptions. The higher the load factor on the equipment, the fewer the number of shoulder hours in which to perform maintenance. A system undergoing maintenance is already in the N-1 state; good practice calls for putting it in that condition at lower than peak load levels. Systems designed to N-2 or N-1-1 criteria are designed to handle the second contingency at peak load levels. Maintenance on these systems is not generally a concern, absent off-normal configurations. When off-normal configurations do occur, studies are generally performed for the specific conditions that exist. For systems designed to N-1 criteria, the maintenance state places the system in a potential loss of load situation for the loss of a second element. Specifically the system of concern at CECONY in this regard is the 138 kV system that is designed to N-1 conditions.⁹ CECONY does not analyze the maintenance condition from a design basis for the 138 kV system designed to N-1 standards.

iii. Current Planning Processes Meeting Long-Term System Needs

The load forecast uses over 54 years of weather data, and determines that a design temperature variable of 86 degrees has a 33 percent chance of occurrence; *i.e.*, once every three years. CECONY stated that a consultant recently performed an analysis using the 86 degree design temperature variable as a benchmark. CECONY has determined stated that, between 70° to 86°, load changes 300 MW for each 1° change. Saturation causes load to change 150 MW for each 1° change at 86° degrees and above. CECONY determined its 50/50 load probability design temperature variable to be 85.1°, its 67/33 load probability temperature to be 86°, and its maximum design temperature variable to be 89.2°.

The consultants' study showed that the design temperature variable would be approximately 86.3° if a 20 year history were used in the calculation. CECONY estimated that a 0.5° increase in the design temperature variable would cause load to increase about 75 MW because of the

⁹ Distribution systems including those designed as auto loop systems will automatically lose load under maintenance with subsequent outage conditions.

saturation factor above 86°. The change would cause the 2007-2011 capital budget would increase by \$542 million. The report concluded that design temperature variable creep was not significant. The report concluded that expenditures to bring the system back to its 1 in 3 year design temperature variable would be better spent in addressing focused reliability improvements.

The 1° difference in design temperature variable between a 1 in 3 and a 1 in 2 occurrence design basis indicates that the temperature creep reduces the design basis of the electric system to a temperature that would be expected to occur approximately every 2.5 years.

The steam, electric, and gas businesses use different design basis temperatures for planning purposes. The design basis for firm gas customers is 0°, which last occurred in 1943, and which exceeds a 1 in 3 probability of occurrence. For steam purposes, CECONY uses a design demand forecast based on a Temperature Variable that could be exceeded once in three years, but over a 30-year period using a rolling average. CECONY uses a Temperature Variable of 6° in its regression analyses.

iv. Development of System Needs

The planning process couples the existing system expected load growth and location of that load with preset reliability criteria often referred to as design standards. Design standards essentially comprise a set of deterministic contingencies that can be reasonably expected to occur during power system operation. In system design studies, the probability of occurrence of the preset contingency list is 1.0. Under those design conditions, the parameters set up for equipment loadings and loss of load must be met; otherwise the system fails to meet the criteria. In the event of failure, it is the job of the planner to devise alternative solutions that mitigate the design violations in the most economical manner from a long-term customer viewpoint. The single most important driver of new capital investment in the system planning environment is the peak load forecast, and the most effective tool to minimize capital investment is the ability of planners to devise creative solutions.

Planning criteria vary for different portions of the system, and become more stringent as the consequences of load lost or system interruptions increases. For example, radial overhead distribution circuits or single customer spot networks suffer loss of load upon a single contingency. The loss of these system components generally does not involve significant load or major portions of the system. More integral portions of the system are designed to withstand a single contingency without loss of load that may involve more than a single system element. The most secure portions of the system may be designed to withstand double contingencies.

CECONY's distribution networks in Manhattan, Bronx, Brooklyn, and Queens are designed to a second contingency design criterion; *i.e.*, with two associated feeders out of service the remaining system must have adequate voltage and power flows to remain within applicable thermal ratings. Design of the Staten Island and Westchester distribution networks uses a single contingency. The 4.16 kV unit substation grid system exists in all boroughs except Manhattan. Brooklyn, Queens, and the Bronx use a second contingency design, while Staten Island and

Westchester are designed for first contingency operation for the 4.16 kV unit substation grid systems.

CECONY identified 17 load areas that it studies separately under system conditions particular to those areas of the system. The Company does not design all load areas to the same reliability criteria. CECONY designs 9 load areas to withstand the second contingency and the remaining 8 load areas to withstand a single contingency. CECONY determines which load areas are designed to single and double contingencies as follows:

- A load area supplied by the 345 kV transmission system is designed for the second contingency
- Specific 138 kV load areas are designed for the second contingency
- Remaining 138 kV load areas are designed for a single contingency.

Northeast Power Coordinating Council (NPCC) reliability criteria only apply to the bulk power system. The New York Independent System Operator (NYISO) uses NPCC reliability criteria. The New York State Reliability Council (NYSRC) criteria are those of the NPCC plus additional locational requirements. The rules of the NYSRC, a FERC approved organization, must be in addition to NPCC, tighter than NPCC, or equal to NPCC. NYSRC does three things.

1. Adopts all NERC and NPCC rules.
2. Has its own compliance monitoring in addition to compliance monitoring done by NPCC and requires, by agreement mandate that the NYISO abide by the NYSRC rules
3. Sets installed reserve requirements for the NYISO. The NYISO sets locational reserve requirements for NYC, Long Island, or other identified reliability areas.

The NYSRC uses the NPCC definition for bulk power system. The bulk power system is identified by a functional method determined by testing the system with both load flows and stability simulations. If those simulations determine that specific equipment can affect high voltage bulk power facilities, then the facilities studied are considered bulk power facilities. For example, if the operation of equipment at a 138 kV substation could cause instability to the high voltage power system, then that facility is deemed to be a bulk power facility, and must be subject to all NPCC/NYISO/NYSRC rules and criteria.

CECONY uses its internal transmission planning criteria to design those elements of its internal power system not considered bulk power facilities. CECONY's policy is not to withstand violation of design criteria, even for a short time. For example, if a criterion were to be violated by a minor overload scheduled to be corrected within a few years by the construction of another project, CECONY would identify operational protocols that would mitigate the violation until the project was constructed.

The table on pages 78 and 79 of the NYSRC reliability rules cross references NYSRC rules with those of NPCC, NERC, and NYISO. The NYSRC criteria are basically the same for bulk transmission design; however the NYSRC does include special actions regarding generation in NYC. All these criteria require no loss of load upon a single contingency, but allow the loss of load on a limited, planned, and controlled basis for more severe contingencies involving busses or multiple elements. CECONY transmission design criteria do not allow loss of load for either as a first contingency.

CECONY designs the 345 kV system with maximum transfer into NYC (approximately 5,000 MW) for N-1 conditions, and assumes a line to be out of service. However, only anticipated transfers (defined as historical transfers of approximately 3,000 MW) are required to be assumed under line-out conditions. The line-out transfer level design requirement is determined by the use of fast action resources in the NERC, NPCC, NYISO, and NYSRC reliability criteria. If fast action resources can reduce system transfers down to historical transfer levels or lower, then CECONY remains in compliance with the reliability criteria. If fast action resources can only reduce transfers to a level that is above historical transfer levels, then CECONY would be in violation of NPCC design criteria. The issue may be one of semantics, and if so, it should be clarified in CECONY's planning criteria.

c. Standard Planning Parameters

Planning parameters are generally grouped as allowed voltages during normal and emergency conditions, allowed equipment loadings during normal and emergency conditions, engineering input data, load forecasts, and system contingencies that the system must be designed to withstand.

As noted above, CECONY designs the various portions of its system to different system contingencies. Although not standard across CECONY, the contingencies are consistent with the importance of system integrity under consideration and similar to the philosophy of many major utilities.

Allowed voltages for the distribution system are 114 V to 126 V under normal system conditions and 108 V under emergency or contingency conditions, as required by the NYPSC. The transmission system is required to remain within 5 percent plus/minus of nominal voltage under both normal and emergency conditions. Such practice is common across the utility industry as the high side limitation is a manufacturer's limitation and the low side limitation must allow for further voltage drop while maintaining national or state voltage standards at the customer meter.

The load forecast used by all planners emanates from the annual peak load forecast, which makes it uniform across CECONY. Input electrical data for use in system studies emanates from central engineering, and is updated as the system changes on a continuous basis. Again, data is consistent across CECONY because of the single source.

Equipment and line ratings are dependent on the power flowing, ambient temperature, and system conditions. Consistent parameters are not used across CECONY and are fully discussed below in Section VIII.B.2.b of the report.

d. Incorporation of Non-Economic Costs/Benefits and Risks in the Decision-Making Process

The relative net present value cost over the life of the alternative projects comprises a primary determinant in CECONY's decision-making processes for transmission projects. The requirements of CECONY Transmission Planning Criteria and the NYSRC Reliability Rules for Planning and Operating the New York State Power System form another primary influence on

the decision-making process. Where alternative project solutions are similar in net present value cost over the lives of the projects and where one solution performs better in terms of voltage response, operational loading margins, or impact to merchant projects, those impacts will weigh in the decision making process. In addition, changes in load growth and patterns, projected Demand Side Management (DSM) programs, and the alternative's impact on transmission upgrades beyond the single contingency design are also considered.

Other non-financial attributes that weigh in choosing from among alternative transmission solutions required as a result of a need established by a reliability assessment include the ability of an alternative to enhance the system's ability to transmit power across a given transmission interface or interfaces, expandability to meet future power system needs, simplicity in design, construction, and operation of the system, the requirement for changes in other segments of the system, and distribution benefits that accrue to the distribution infrastructure by closing the distance between load centers.

CECONY does not weigh the various aspects of non-economic costs and benefits or risks in choosing from among transmission solution alternatives, but subjectively applies its planners experience and expert engineering judgment as the non-economic attributes relate to future cost.

e. Uniform Prioritization of Projects

Uniform prioritization of projects and the impact priority has on project completion are included in Chapter XI - Budgeting.

f. System Planning Organization, Staff Skills, and Capabilities

The Transmission Planning Department is led by the Chief Engineer, who directly reports to the Vice President – System and Transmission Operations in the Central Operations Group. In addition to the Chief Engineer and one administrative support person, the department consists of 26 technical people organized into 4 sections and a reliability Technical Leader centered on the required functions of the department. The Chief Engineer, Section Managers, and Technical Leader all hold bachelor and master's degrees in engineering. The Technical Leader also holds a doctorate.

The Transmission Reliability Section is comprised solely of the Technical Leader who is responsible for interaction within and outside CECONY on matters pertaining to transmission system reliability.

The Interconnection Services Section is responsible for all system and reliability studies pertaining to interconnection to the CECONY transmission system. In this section, two Senior Engineers are responsible to perform detailed interconnection analysis. The Senior Engineers are supported by two Associate Engineers (one of those positions is currently vacant). One of the Senior Engineers holds an engineering masters degree.

The Bulk Power System Performance and Planning Section is responsible for analysis of the bulk power system, and is staffed by a Technical Specialist, three Senior Engineers (of which

one position is currently vacant), two Engineers, and two Associate Engineers. One Engineer and one Associate Engineer hold advanced engineering degrees.

The Standards and Compliance Section is responsible for ensuring that compliance with national, regional, and New York reliability standards is maintained. The section is staffed with two Technical Specialists, of which one holds a masters degree in engineering. In addition, a Senior Engineer and an Associate Engineer, both with advanced engineering degrees, support the section.

The Long Range Analysis and Planning Section is staffed by a Senior Engineer and two Engineers with one Engineer position currently vacant. Neither holds advanced degrees. In addition, two Associate Engineers, both which hold advanced degrees, support the section.

The following table summarizes the Transmission Planning Department staffing and capabilities.

System Planning Department Staffing

Title	Personnel Numbers	Vacancies	Avg. Yrs. in Position	# Advanced Degrees	Doctorate Degrees
Dept. Head	1	0	6.0	1	-
Admin	1	0	-	-	-
Section Head	5	0	3.0	5	1
Tech. Specialist	3	0	10.0	1	-
Sr. Engineer	7	1	7.5	2	-
Engineer	4	1	2.5	1	-
Asst. Engineer	7	1	1.5	4	-
Totals*	23	0	4.5	13	1

* - Without department head, vacant, or administrative personnel.

The Transmission Planning Department has a high ratio of advanced degrees to total employment. All Section Managers have advanced degrees.

g. Standard Decision-Making Rules for Design Options

CECONY written guidelines address the number of contingencies the various areas of its system must be designed to withstand. Although not identical across the transmission or distribution system, the design criteria are consistent with the importance of the system involved.

CECONY applies standard decision-making rules across all regions with regard to transmission and distribution system designs through published standards. Those standards include conductors and cables that have a single normal and emergency operating temperature, standard network transformer and associated network protector sizes, standard load curves for transformer ratings, and acceptable loss of equipment life if allowed at different contingency levels.

Equipment and line ratings are dependent on the power flowing in the equipment, ambient temperature, and system conditions. Consistent parameters are not used across CECONY and are fully discussed in Section VIII.B.2.b of the report.

Much of the CECONY service area is in NYC, which requires undergrounding. Manhattan has no overhead facilities. Staten Island and Westchester have 13.8 kV systems that feed into a 4.16 kV grid. These systems are designed to a single contingency. The Bronx, Brooklyn, and Queens have 13.8 kV or 27 kV auto loop systems designed to N-1 conditions. These systems feed into a 4.16 kV grid designed to the second contingency. The 4.16 kV grid is fed from area substations. Each 4.16 kV substation has 4 feeders where 4.16 kV lines tie back to other 4.16 kV substations.

The transmission system is an underground system from the Dunwoodie substation southward.

CECONY will construct overhead facilities where possible, but time has developed well defined areas where the overhead design option is not available.

h. Regional Differences of Planning Processes, Guidelines, and Standards

The CECONY system is a very compact power system consisting of the NYC area plus Westchester County. Regional differences are minimal. As noted above, regionality plays a role in determining whether the system will be designed as an overhead or an underground system and therefore, the resultant reliability level that the system is designed to. Regionality does not influence the ultimate physical design as the physical system design is standardized across all regions. Regionality in the case of CECONY reduces to the higher design level of reliability designed into the underground systems.

CECONY analyzed the potential for regional temperature differences changing its load forecast and concluded that temperature was not a regional variable.

i. Feedback on Field Results to Planners

Planners specify the type of equipment needed, its power capacity requirements, and the date that the facilities are required. If planners determine that a project can be delayed because of changed circumstances such as load growth, reliability needs assessments will identify that condition and changed project in service dates will flow thorough the budget process. Likewise, should a project become delayed for reasons other than planned delay, planners may perform analysis to develop mitigation measures to accommodate construction realities.

CECONY also tracks reliability indices as a measure of system performance for both the transmission and distribution systems. CECONY defines the System Average Frequency Interruption Index (SAIFI) as the total number of customers interrupted X 1,000/total number of customers served. This is done on an area and system total basis and is calculated per 1,000 customers. CECONY also defines the Customer Average Interruption Duration Index (CAIDI) as the customers interrupted X duration in hours/total number of customers interrupted. This index is also done on an area and system total basis.

A major storm as defined by law is excluded from the calculations if the event involves 10 percent of the customers or if the event is 24 hours in duration by area or in total.

CECONY has a threshold SAIFI and CAIDI goal which is the lowest level of adequate service and reaching this goal requires action and a response to the PSC. An objective SAIFI and CAIDI

goal also exists. That goal is considered reliable and is what is strived for. In 2003 and 2004, SAIFI threshold and objective goals were set on a borough basis and for the network and non-network systems and CAIDI threshold and objective goals were set for the total system network and non-network systems. For 2005 through 2007, threshold goals were set for system wide SAIFI and CAIDI for both the network and non-network systems.

The goals set in 2003 became outdated with the installation of the System Trouble and Reporting (STAR) system in Westchester in 2003. Other regions used an older platform based on connectivity that tied in the Cuff Link system which is the number of meters per address. The total CECONY system was on STAR by 2007. CECONY found that the differences in outages reported were similar for the non-network systems. CECONY also found that for the network systems, the STAR system produced 170 percent more outages than the old legacy Cuff Link system. This difference is due to the differences in the manner in which calculations are made but influences whether NYPSC goals are met. CECONY's current reliability goals are set slightly lower than the NYPSC mandated goals by region so increased outage identification automatically requires additional reliability improvement by CECONY. The process as implemented by CECONY ensures that NYPSC reliability goals are met as its reporting system matures.

2. Technical Elements of System Planning

a. Credible and Compatible Planning Input

Planners need to reduce the topology of circuits forming a power system to a mathematical model in order to perform power flow, stability, or short circuit analysis. Electrical data is standardized to a common electrical base. In addition to electrical data, future loads and their location must be represented in the models and the various ratings of equipment must also be known. Distribution and network planners at CECONY receive loads from the Peak Load Forecasting Department that are calculated on a network by network basis and are coupled with the radial feeder load forecast.

The network's peak load characteristics change by location. In Manhattan and downtown the basically commercial load peaks from 3 pm to 5 pm. In the uptown area (West of Central Park and above 77th Street), loads are a mixture of residential and commercial. In the Brooklyn/Queens area, load is more residential in nature.

Information regarding the so called *City Split* is prepared by the Peak Load Forecasting Group. Target DSM information that is used in planning is done by the Energy Efficiency department and is also included.

The preparation of the 13.8 kV feeder and 13.8 kV to network voltage transformer 2-year load relief program does not use the next year's projected contribution of DSM in determining load relief required. The issues are: (a) that the DSM may not occur in the year expected, (b) that equipment would become overloaded, and (c) that it is very difficult to pinpoint DSM to a particular feeder overload. When performing 10-year area planning analysis where the 138 kV/13.8 kV substation serves mostly one and sometimes two networks, loads net of DSM (targeted phase 1, 2, 3, and 4 DSM programs) are used, because the aggregate DSM will show up

at that system voltage level. The Transmission Planning group uses the aggregated loads at the area substation basis for its analyses.

CECONY stated that most of the DSM contributions are efficiency related to the changing of light bulbs and that those are audited. After audit, load forecasts include the contribution of DSM in the base load figures.

Central Engineering supplies the electrical data (impedances) and equipment ratings.

b. Equipment ratings

CECONY determines the power carrying capacity of all distribution and transmission equipment on its power system. Equipment and line ratings are dependent on the power flowing, ambient temperature, location (indoors or outdoors), and system conditions. The lowest rated piece of equipment determines the rating for the series system element. Equipment ratings are developed for summer and winter conditions under both normal (continuous loading capability) and emergency conditions. Emergency ratings are further developed for both long-term and short-term emergency conditions. Allowable equipment temperatures or loss of life are calculated using the appropriate industry guides and standards for the various equipment. Industry guides and standards many times use different temperatures or time durations to determine the nameplate or overload capability of different pieces of equipment. For example, transformers are designed with and rated at a 30° C (85° F) average 24 hour ambient temperature while rigid bus materials uses a 40° C ambient.

If the average 24-hour ambient temperature at CECONY differs from that used in equipment design or relates to a different peak daily temperature reflected in the 24 hour average temperature, then those differences must be taken into consideration and equipment ratings appropriately modified. Also, 24-hour average ambient temperatures are not appropriate for use in the calculation of short-time ratings for some equipment such as overhead conductors.

Liberty's review found inconsistencies with the calculation of equipment rating data. As an example, the short-time emergency rating for overhead transmission conductors is 15 minutes in duration, yet 20 minutes for underground cable. Another example is that for network transformers that are rated using a 26° C summer earth temperature adjusted for area of the vault grate while underground transmission cable ratings use a 25° C earth temperature. In some cases, continuous ratings are also used for short-time ratings. Liberty believes that the use of legacy methods in equipment rating calculations produced the differences.

c. Appropriate Dynamic and Static Models

The representation of the power system takes place through detailed mathematical models. Models are divided into the two distinct groupings of static and dynamic representations. Static models capture the power system at one instant of time and dynamic models integrate the system response over time. Historically, some dynamic models that study traveling waves created when switching occurs were analog based. The older analog models were cumbersome, very limited in capability, and have been replaced by digital based models that iterate time to determine the change in system response.

i. Transmission and Area Substation Planning Models and Software

The NYISO and CECONY use the same system planning program; *i.e.*, the PTI PSS/E (Power System Simulation/Engineering) program package widely used across the industry. This software is used for load flow, stability, short circuit, and long-term dynamic analyses. Both the NYISO and CECONY now use the ASPEN program for short circuit analysis. The ASPEN program is also in use industry wide.

Typical stuck-breaker clearing time used for the simulation of a 3 phase fault followed by one breaker pole sticking is in the order of 15 cycles. Swings are well damped, have a period of less than a second, and rotor angle excursions are about a maximum of 90 degrees. Stability runs are run out to 10 seconds and use the full IEEE machine representation with models for the exciters and governors.

For switching surge studies, the Mitsubishi Electric EMT program is used. The NYISO has plans for energizing the grid from black-start conditions. CECONY can synchronize to the backbone system or can start restoration as an island. Black-start plans are reviewed each year. Also CECONY meets annually with the NYISO and generators to review black-start plans.

Transfer limits are also determined using the PTI package. A DC load flow¹⁰ is used to initially calculate the transfer limits. The resultant values are confirmed with load flow and stability analysis. The CECONY system is not stability limited.

Multi-area reliability analysis is done at CECONY using the GE MARS program.

CECONY obtains its SC model from the NYISO. The model is modified to include a detailed model of NY and an equivalent for all systems outside of the control area. CECONY obtains its load flow model from the NYISO which uses the NERC large system model. CECONY replaces the CECONY model with its own detailed model down to the 13.8kV busses at the area substations. CECONY obtains its stability model from the NYISO which again uses the NERC large system model. CECONY replaces the CECONY model with its own detailed model down to the 13.8kV busses at the area substations. CECONY also ensures that merchant plant data is of sufficient detail for good results.

ii. Network Planning Models and Software

Each region of CECONY performs network modeling. The same planning tool is used by all regions. The model starts with the area substation high side 138 kV bus as an infinite bus. Each area substation serves one or two networks. Each area substation (including breakers and transformers, network feeders, network transformers, and the sources to the secondary grid) is modeled in detail. The loads of the secondary grid are lumped on the low side of the network transformers. CECONY uses the real time monitoring of the network transformers to ensure the loads are placed correctly. If an overload is found, CECONY carves out an area 10 by 10 busses

¹⁰ A DC load flow is one where only the resistance of the system components is represented. This load flow is often used throughout the industry for fast screening of a large number of cases.

away from the overload to perform a detailed study. Because of the way the load is modeled, not all overloads may be found.

The model data down to the network transformers is good, and undergoes checks to ensure accuracy. The secondary grid data has problems where inaccuracies occur due to mapping errors and that is the reason why the loads are modeled on the network transformer load side busses and balanced to actual data. CECONY has the secondaries and services mapped, but the load data at an address is a different data file that is not linkable to the topology file. The network supply studies use this model.

For secondary analysis or if a new load is coming on line, CECONY again carves out an area 10 by 10 busses away and manually spots the load data and checks topography. Studies are conducted from that model.

CECONY has been correcting the deficiencies in the secondary information and mapping systems since 2006. CECONY has used vision mapping overlaid on the secondary grid to identify mapping inconsistencies. The Company has distributed the loads by address and updated the secondary system topology in 13 networks. When these networks are studied, the new correct models are used. CECONY is validating the data on a real time basis in the Sutton network, and plans to have all 60 major network secondaries updated by 2011.

Because no suitable software was available in the industry, CECONY developed the Poly Voltage Load Flow (PVL) program, which can perform load flow, voltage drop, motor starting, and short circuit analysis on the secondary grid. A single 12-hour rating is developed for all secondaries in the network. Network transformers are rated using one of four pre-determined load cycles and ANSI overload guides. A normal continuous rating with 0 percent loss of life and an emergency 8-hour step rating with no loss of life are developed. If the transformer is loaded to more than 125 percent of emergency rating, it is scheduled as high priority load relief for the following summer. Transformer loadings of 115 percent to 125 percent of emergency rating are considered medium priority replacements.¹¹ CECONY said that some of the medium priority replacements are done in the prior year because of scheduling or work load requirements.

A companion program to the PVL program is used by operations on a real time basis. The program is called the World Class Operations Load Flow (WOLF) program. Operations personnel use this program in everyday operations and as a guide during outages for development of restoration sequences that result in minimum exposure to further outages to customers.

iii. Distribution Planning and Software

The software that CECONY uses is the PVL program that CECONY developed and is described above. The program includes ratings calculations, short circuit, and a load flow program. All studies are done in the regional engineering offices.

¹¹ It is noted that emergency ratings may be 140 percent to 170 percent above nameplate ratings.

The 13.8 kV and 33 kV network cables are modeled in PVL. There is quite a bit of OH that is auto looped back to another feeder. Vacuum recloser voltage and current are monitored. Reactive is not monitored. The OH is modeled separately with block loading and voltage from SCADA. CECONY then looks at the auto loop closing and the loss of the other feeder. Liberty notes that the supply side voltage is analysis not correct. CECONY is aware of this shortcoming in its model.

CECONY is in the process of installing the Electric Power Research Institute (EPRI) Distribution Engineering Workstation (DEW) throughout all regions. This model is a three-phase network distribution workstation. CECONY started implementation 2 years ago in the Staten Island model. CECONY is currently validating the Staten Island model. The model is tied to the mapping system so that updates can be captured. It is also tied to the Transformer Load Management program for transformer loading information. Brooklyn and Queens are using an industry standard radial program called CYME-DIST. CECONY plans to install the DEW program in Bronx/Westchester next and plans to begin in 2009 with an 18-month timetable. After completion of the Bronx/Westchester models, conversion of Brooklyn/Queens will commence also with an 18-month timetable ending approximately at the end of 2011.

The new DEW program has the capability to analyze a three-phase looped system from the transmission system to the customer meter. CECONY models from the 138 kV side of the area substation down to the low side of the distribution transformer. To maintain PSC required voltages at the customer (114V – 126V normal and 108V during contingencies), CECONY uses a rule of thumb voltage drop of 2 percent to the customer meter from the voltages observed at the low side of the transformer.

3. New Technologies

New technologies result in the solution of system difficulties, and can generate economies through more efficient use of the existing system, the deferment of future system requirements, better service or reliability, and efficient use of personnel. Essentially, these goals are among the goals of the third generation (3G) System of the Future through the use of new designs, advanced based information technologies, and real time data.

a. Investment in New Technology for System Redesign

One of the first steps taken by CECONY in the application of new technology to the power system is the development of the Advanced Metering Initiative (AMI). CECONY states that the smart grid is more than AMI. The smart grid starts at the generation source, goes through the transmission and distribution systems, and extends to the customer. CECONY states that a lot of monitoring on the transmission system through SCADA has been done, and that all breakers can be remotely operated. Network transformers are also monitored (but not controlled at this time). CECONY believes that it needs more intelligence in the secondary grid, and that AMI will provide it. No timetable has been established for AMI, but CECONY plans to start using the technology as a portal in 5 years. AMI was looked at 10 years ago and it was not found to be economic at that time.

CECONY has a pilot AMI in Westchester. In this application, gas and electric meters are read from vehicles. It is a 928 MHz system with 8 signals separated by 2 KHz. The electric meter communicates continuously. 400,000 customers are on this pilot system, with 200,000 to be added. CECONY expects completion of this pilot in the first quarter of 2010. The NYPSC asked to look at AMI and real time pricing in 2006. CECONY ran a demonstration project involving 100,000 customers in Queens and 100,000 customers in the southern Bronx regions. CECONY states that an AMI system for its 4.5 million customers would cost \$800 million¹² and that \$60 million in total benefits would be achieved. A technical conference held by the NYPSC showed that the results were not consistent throughout the state. The NYPSC has not yet decided what the fundamental standards will be.

CECONY's future view is of one grid where smart metering integrates the local transformers into the main grid providing improved reliability, deferment of construction, and facilitation of demand-reduction programs. The communications media have yet to be determined. There are different approaches being suggested throughout the industry. CECONY broadly defined the vision of a smart grid in the spring of 2008. CECONY believes the use of spot networks will be one application of the smart grid.

CECONY benchmarked other major urban utilities throughout the world with regard to reliability¹³. CECONY noted common design elements of reconfigurable system architecture, minimal low voltage meshed networks, extensive use of underground, use of gas insulated transformers, and multi utility tunnels. CECONY states that these concepts will be considered when developing future system designs.

The first 3G design is that of asset sharing for growing demand in areas that will require new substations and underground infrastructure construction to meet that demand. CECONY has one installation in progress. The 4-transformer York substation will have a superconducting cable installed to the 5-transformer 75th Street substation. The superconducting cable is a separate demonstration project tied into the York and 75th street project. The sharing of transformers is accomplished as follows. Only 3 transformers are installed in what otherwise would be a 4-transformer station. The 5th transformer in a 5-transformer station is configured so that it can be sectionalized to supply the needed capacity to the 3-transformer station if required. Phase angle and distance are major considerations; otherwise power flows are not suitable for sharing assets.¹⁴

CECONY has a voluntary thermostat control program that can be overridden by the customer. The program is used during peak shaving conditions, but does not operate through the meter. CECONY states that results of the program can be seen on an area substation basis. A full AMI program would allow the load changing results to be known on a network transformer or house-by-house basis.

¹² The cost stated per customer is consistent with that stated in another engagement where a 450,000 customer program was estimated to cost \$100 million.

¹³ All of the utilities benchmarked are not constrained by geography when developing the surrounding transmission system as is CECONY.

¹⁴ OEGW believes the information in this paragraph is now outdated. However, CECONY validated the information during its factual review.

CECONY has identified many R&D projects that it considers smart-grid related. Those projects are:

- Intelligent prediction of weather event and likely consequences
- Development of the capability to sense arcing and partial discharge in real time
- Development of practical fault current limiters and superconducting cable links
- Development of fast network switches
- Development of software to anticipate failures and prioritize recovery
- Development of fast simulation models for the entire T&D system for enhanced outage analysis and facilitation of system configuration.

CECONY has also developed a new switch that can be used in manholes; it is SCADA controlled. This equipment was not available from the industry.

CECONY has many concepts and initiatives for the 3G system of the future and has a vision on how they would be integrated. Many initiatives are years if not decades away and will require the expenditure of significant amounts of capital, just as expanding the system infrastructure would do. Liberty has not seen analysis that determines what initiatives must be accomplished by what date in order to minimize costs to customers. Further discussion and suggestions appear in section B.3.c of this report chapter.

b. Optimum Use of Existing Technologies in Planning

CECONY employs existing technology into its planning studies. One such application is that known as series breaker applications in its transmission planning process. Older breakers were somewhat larger than their counterparts today. System contingencies must be represented where a breaker fails to operate requiring that remote terminals must clear causing the loss of additional system elements. The loss of additional system elements can produce equipment loadings and voltages that are not acceptable and require mitigation through capital expenditures. The addition of a two circuit breakers in series arrangement that can now physically fit in the area that a single breaker previously occupied has recently become popular. When the system contingency is analyzed that includes the failure of a breaker to operate, the use of series breakers prevents the loss of additional system elements and capital expenditures are not required.

CECONY uses series reactors to limit increasing fault duty on the power system. Fault duty increases as more generators are installed and as parallel transmission paths are constructed in the system reducing system impedance. Alternatives available to CECONY to address increasing short circuit duty include the use of the newer 80 kA breakers that do not fit it current circuit breaker positions or to split the transmission system into two or more¹⁵ electrically separate systems to maintain short circuit duty levels so that existing equipment can interrupt faults.

CECONY uses phase shifting transformers to control the flow of power on its system. The best example is the 345 kV/ 138 kV interface south of the Dunwoodie substation towards NYC. Different system configurations and loads experienced on this interface result in unequal flows

¹⁵ Some utilities have 4 separate transmission systems operating in parallel to reduce short circuit current to acceptable levels for equipment.

on essentially what are parallel system paths. Phase shifting transformers allow CECONY to maximize the flow of lower cost power into the city from the NYISO by regulating the power flows on these cables on a real time basis.

CECONY does not use new solid state technology (also called Static Var Control) on its T&D systems to provide dynamic reactive support during disturbances, as its need has not been demonstrated. CECONY does not employ the use of series capacitors on its transmission lines, because the CECONY transmission lines are relatively short resulting in small line inductance when compared to other parts of the country.

Another technology being integrated into the CECONY system is advanced SCADA. The transmission system is in the process of having a new GE SCADA system installed. This project started in 2002, is 60 percent completed, and will be finished by May of 2009. At that time all transmission locations down to and including the area substation 13.8kV bus will have full SCADA. SCADA systems will be redundant and backed up.

Prior to the new GE system, the transmission system had a Boeing System Operations Computer Control System (SOCCS) for SCADA and a newer (1990) version, SOCCS-X, was in use for the area substations. The SOCCS system was shut down in 2008. The SOCCS-X system is still in use for the area substations, and will be cut over on a piecemeal basis as the new SCADA system is completed. The new SCADA system at each area substation also has a power quality mode which can determine where faults are located on a 13.8 kV feeder. The determination of fault location will improve dispatch efficiency. Part of the new SCADA project was also to establish a back up control center. Each control center has 2 functions, bulk power and district operations. District operators are responsible for switching, tagging, and isolation. A new AC contingency analysis package has also been added.

There are four regional control centers (Brooklyn/Queens, Manhattan, Bronx/Westchester, and Staten Island). Brooklyn/Queens, Bronx/Westchester and Staten Island regional control centers manage network and non-network system while the Manhattan regional control center manages a network system only. Their role is to manage the human resources to accomplish the work. The regional control centers dispatch switching under the jurisdiction of district operations at the energy control center.

The 27 kV looped system, 13.8 kV looped system, and 4.16 kV unit substations (non-network) all have monitoring and remote control capability. The three regional control centers with separate non-network legacy systems are being upgraded with an advanced ■ SCADA system and each regional system will serve as an emergency and disaster recovery site for each other.

The networks have data acquisition only for network protectors and network transformers. CECONY stated that these systems are to be fitted with the same SCADA platform as the transmission system over the next 5 years. CECONY believes that additional information concerning the networks such as transformer pressure, temperature, and oil temperature sensing will allow reduced failure rates for network transformers. CECONY will also be looking at the ability to find open current limiters in the network.

Each of the non-network 4.16 kV grids has a fully managed load shedding program as part of the ■■■ SCADA system. Voltage control by grid is a planned upgrade component of the ■■■ SCADA platform in the regional control centers.

Auto loops have the vacuum recloser under SCADA control. CECONY plans to have all auto loop devices under SCADA control. If ■■■ switches are used in the field, they are not capable of SCADA control and must be replaced with ■■■ switches that have a Remote Terminal Unit already installed.

CECONY is also considering SCADA controlled sectionalizing switches on long overhead feeders or other ways to bifurcate the feeder.

c. Use of Non-Traditional and Innovative Options in the Planning Process

One such non-traditional technology is that of Demand Side Management (DSM) where the level of demand is managed to afford cost reduction. CECONY has a four phase targeted DSM program. The New York State Energy Research and Development authority has calculated that 30 MW, 10 MW, 1 MW, and 0 Mw of demand have been respectively reduced through March 2008. In addition, the system wide goal of 150 MW has been surpassed with 181 MW achieved through March 2008 at a cost of \$359/kW, which is one half of expected costs.

CECONY reported to the NYPSC in July 2008 that 9.73 percent of the summer time energy usage of 5.8 million MWH was consumed in system losses. The focus of the presentation was on energy and not losses at peak time periods. The 9.73 percent loss figure is that of average energy losses for the entire system over the summer period.

Losses vary with the square of the current; therefore average losses are lower than the losses occurring at peak loads when demand and current are higher. The CECONY system is a 13,000 MW summer peaking system. If average summer energy losses are approximately 10 percent of summer energy usage, then peak losses that are well in excess of 1,300 MW are suggested at time of summer peak due to the squaring effect. CECONY also stated that an additional 75 MW of load on peak would cost \$30 million over a four year period in its analysis of changing the load forecast design temperature variable. Such a relationship between cost of capacity and peak load suggests that significant cost savings may be achieved in the reduction of summer peak load and that such peak load reductions can therefore defer significant capital expenditures.

As noted above, CECONY is considering SCADA controlled switches on its network 13.8 kV feeders. Installed at the midpoint of the network feeder (to act like mid-point reclosers on distribution circuits), some of the network transformers associated with a feeder outage can be returned to service in a short period of time. While there may be no 13.8 kV source connected in many instances, a high voltage path is provided allowing more network transformers to remain in service and reduce overloads on the remaining network transformers. Such application could influence the number of feeders feeding a network and the investment at the area substation to support those feeders but would not influence area substation capability. SCADA control of network transformers and network protectors is required.

4. Other Issues

Reliability that the customer sees is often measured by indices that measure frequency and duration of outages. For all practical purposes, the transmission system contributes very little in terms of outage minutes to these indices due to their looped configuration nature. That is, if a system is looped, customer outages do not occur because there remains an alternative path to provide service if an outage occurs. On distribution systems that are not looped, a contingency causes direct customer outages. Generally, customer outages are driven by major storms, contact with vegetation and equipment failure due to either system conditions or design limitations.

a. Vegetation Management

i. Transmission Vegetation Management Practices

Transmission line vegetation management (VM) is a separate organization from the distribution vegetation management organization. Transmission VM is responsible for 138 kV and 345 kV lines and a 500 kV line that is in the Orange and Rockland (O&R) service territory. CECONY also owns 7 lines jointly with O&R that O&R maintains to CECONY VM specifications. CECONY requested additional funding in the last rate case to complete vegetation inventory work, mechanical removals of incompatible vegetation, and herbicide applications within a three year period. The NYPSC granted funding for this endeavor for 2008.

Transmission lines are maintained on a three-year cycle that manages approximately one-third of the system line mileage each year. CECONY follows up on the mechanical activities with a low volume back-pack application of herbicides. CECONY inspects its transmission lines with both aerial and ground patrols. Aerial inspections are made on a monthly basis and ground patrols are performed two times a year. The times for the ground patrols are after the winter and after the vegetation growing season.

Trimming specifications vary by voltage, and follow the NERC guidelines of establishing a wire zone and border zone. CECONY is in the process of carrying out a NYPSC 2005 order to remove all incompatible vegetation in the transmission right-of-way to the property boundary or easement width. CECONY expects to be in compliance with their NYPSC Land and Vegetation Management Plan in 2009.

No public personnel are allowed on CECONY transmission rights-of-way (ROW) without proper approval and all ROW's are owned by CECONY except for the line that straddles the Catskill Aqueduct. The right-of-way along the aqueduct is narrow. CECONY is completing vegetation inventories on narrow corridors as per the NYPSC order. This assessment work is expected to be completed in September 2009.

ii. Distribution Vegetation Management Practices

The distribution VM program is split into three parts. The first part consists of the Bronx and Westchester regions, which report to the Bronx and Westchester construction manager, has a \$10 million budget, has four inspectors, two of which are certified arborists and two have vegetation control experience. There is one inspector for Staten Island with a \$1.5 million budget who

reports to Public Improvement in Construction Management. Another VM inspector resides in Brooklyn and Queens, is a line supervisor, has a \$1.7 million budget, and reports to the OH Section Manager.

By pole count, the Bronx and Westchester regions represent just over 50 percent of the overhead system. Tree density is also much greater there. Of all outages occurring, 20 percent are tree related in Westchester, 9 percent are tree related in the Bronx, and 2 to 5 percent are tree related in Brooklyn, Queens, and Staten Island.

In late 2006, the VM program was modified as a result of outages that had taken place. This was prior to the Vantage audit. The modifications made in 2006 were:

- New clearances were added. The old specification called for 6' bottom, 6' side, and 10' top clearances. The new specification was 10' bottom, 10' side, and 15' feet top clearances and this is called the preferred clearances. However, CECONY, only trims to the new clearances in Westchester while the other regions trim to the old clearances now called alternative clearances. Note – That means the 33 kV on Staten Island is trimmed to the alternative clearances, but CECONY has placed it on a 2-year trimming schedule.
- Under the old VM program, trimming was done by maps or grids so that the municipal would not have to be contacted many times throughout the year. That left portions of circuits untrimmed if they crossed the map boundary. This process was modified in 2006 so that circuits were trimmed by circuit.
- The old trimming cycle was only funded to be a 4 to 4½ year cycle. With the modifications and with funding, and beginning in 2007, the trimming cycle became 3 years for 13.8 kV and 4.16 kV circuits and 2 years for 27 kV and 33 kV circuits. The length of the trimming cycle is determined on a calendar-year basis. All circuits will be trimmed to new cycles and specifications by 2009.
- Reinforcement of the A300 industry pruning standards was done.
- Brush was not addressed in the old VM program. Brush is defined as 4" diameter at breast height. Removal of brush was added in the modification of the VM program.
- Added stump treatment where possible. Chemicals are not allowed in some municipalities.
- Placed greater focus on tree removals.
- Provided for education and development of staff.
- Community outreach and educational programs were added. This includes communication on the VM program, notification of the work being done, and working closely with the boroughs. Note – CECONY says this program has paid huge dividends and sees it a win-win.

The clearance requirements are essentially require a box configuration. CECONY states that for new construction, they try to obtain ground to sky clearance distances with directional pruning. CECONY trims both three phase and single phase taps to the same specifications. Also, CECONY makes no differentiation to whether the tap is fused or not in its trimming. Larger deadwood only is targeted for removal within the reach of a 75' truck. All vines are cut and treated where possible. Tree trimming crews will remove the vines if that work can be safely done. If not, the removal is turned over to CECONY.

CECONY secures contracts for 100 percent of its trimming. Contracts are bid on a unit mile basis. There are different unit mile bases for circuits with and without chemical applications because of the cost of chemicals and labor. 100 percent of the unit mile work is inspected by CECONY. Payment is not made and no further work is allowed by the contractor until the “go backs” found by inspection are corrected to CECONY's satisfaction. CECONY currently has a two-year fixed price contract for 2008 and 2009 with two contractors. CECONY is planning to go out for a three-year fixed price contract for the next trimming cycle.

Trees within the public ROW are owned by the municipalities. CECONY works with the municipalities and targets the trees under the line for removal based solely on reliability and not economics. In 2007, approximately 8,500 trees were removed and in 2008, approximately 5,000 trees have been removed through July 2008. In 2008, CECONY established a targeted “danger tree” removal program. These are trees that are off of the ROW and that pose a danger to circuit operation.

Due to the fragmentation of management to implement what is a company-wide vegetation management program, Liberty requested inspections in each region of circuits that: (a) just had vegetation management performed, and (b) were just coming due for work. In the first case, recent work could be reviewed for conformance to the new company-wide standards and the second case allowed a review of work that was performed under the old standards as those circuits had not yet come under the three-year VM cycle. Generalized results of the Liberty inspection were:

- Westchester – Previous established trim zones evident and violations to new standards with 100 percent inspection noted
- Bronx - Previous established trim zones evident and violations to new standards with 100 percent inspection noted
- Queens - Previous established trim zones evident and violations to new standards with 100 percent inspection noted
- Brooklyn – Less evidence of previous established trim zones evident and violations to new standards with 100 percent inspection noted
- Staten Island – Little evidence of previous established trim zones evident, violations to new standards with 100 percent inspection noted, and one whole circuit found without evidence of any trimming.

b. Network Reliability Levels

There are 60 major networks in total. All networks in Manhattan, Brooklyn, Queens, and the Bronx are designed for N-2 conditions. CECONY defines an N-2 design as two feeders supplying a network or load area simultaneously out of service including associated feeders. To establish feeder diversity, CECONY will not allow more than 2 associated feeders in the same duct bank. Because a single event can take out 2 associated feeders, CECONY either does not dig or hand digs only on hot days.

CECONY has studied the reliability levels of its networks. CECONY used the component failure rates and cause data to develop failure rates for network components and grouped network failures as less than 80 percent, 80 to 85 percent, and greater than 85 percent. A shift factor tells

where load transfers may be accomplished and the use of their design criteria coupled with Monte Carlo simulation techniques compares the failures rates to ratings and then calculates the probability of a network failure.

CECONY found that 20 of their networks had a failure probability of 1 in 100 years or less, another 20 had a failure probability of 1 in 100 years to 1 in 10,000 years, and the remaining 20 had a failure rate probability of 1 in 10,000 years to 1 in 25,000 years or higher. In addition, the median failure rate was 1 in 1,000 years. CECONY states that it has a 10-year network reliability improvement plan that will bring all networks to a probability of failure of 1 in 1,000 years or higher. CECONY also calculated that if all 60 major networks had a probability of failure of 1 in 1,000 years, that there would be no network failures for approximately 20 years.

CECONY states that it is targeting its network reliability improvement programs. For example 3-way-to-1-way and 2-way-to-1-way stop joints are a failure problem due to thermal considerations when applied to different type cables (PILC to XLP). CECONY will remove the 1-section PILC cables in the networks that need improvement first as that will take out 2 problem joints. Other options are being considered. If new networks are established from the existing networks, the probability of failure is reduced. Double cables that terminate in a single breaker can have their own breaker installed to improve network reliability.

Network reliability levels vary widely with much of the difference explained by design parameters as noted above. SAIFI and CAIDI have much more meaning to overhead distribution systems where there is much less redundancy and additional outage causal factors compared to networks. An underground network is supposed to have very low SAIFI and CAIDI values lending itself to the use of failure rates as a measure of reliability. CECONY plans to bring the worst performing networks up to the median probability of failure of all networks (1 in 1,000 years) within 10 years. There is no documentation that the median level of network failure rates should be the target reliability level. While using the median level of failure provides a yardstick to measure existing performance and improvement, the median failure rate should not be considered the default level of reliability. CECONY has no base reliability design level for its networks. The base level of network performance should be determined, including: no oil filled cable, no Ray Chem joints, only one feeder on a breaker, and other known deficiencies eliminated.

C. Conclusions

- 1. The planning horizons used as a guide for long-term system development for area substations, networks, and distribution system are appropriate, allowing for timely system additions that are compatible with longer range plans.**
- 2. Transmission planning is necessarily reactionary; as a result it is driven by short-range planning, biased towards short-term generation alternatives, and largely conceptual in nature.**

- 3. Ongoing maintenance programs and targeted reliability programs should be adequate to maintain system equipment integrity; however some programs produce decreasing reliability benefits per dollar expended. (Recommendation 1)**

CECONY plans to replace all Ray Chem stop joints and all PILC oil filled cable on its system. One section cables are replaced first, then two section cables, etc. As cables with more sections are replaced costs escalate because of cable length, but only two problem joints are removed for reliability improvement.

- 4. Equipment replacement versus repair decisions are appropriately based on availability of parts, serviceability, changing system requirements, or economics with the further requirements that the equipment must be operational and that equipment out of service for repair or replacement is minimized.**
- 5. CECONY is making efficient use of the network systems.**
- 6. The 138 kV system designed to N-1 standards is not analyzed to prevent maintenance difficulties from a design basis. (Recommendation 2)**

Systems designed to N-1 standards are susceptible to loss of load during maintenance conditions at shoulder load levels. Many utilities design these systems with the added requirement that maintenance must be able to be accomplished by requiring an N-2 design, but at a lower load level that is reflective of the time when maintenance is performed.

- 7. The reliability criteria used by CECONY for design of the various portions of its distribution system are consistent with or more conservative than those used by other utilities.**
- 8. The criteria used by CECONY for the design of its transmission system conform to all national, regional, and state reliability organizations; however the determination of transfer levels used when analyzing line out conditions need to be clarified. (Recommendation 3)**

System reliability criteria allow for transfer levels to be adjusted between the first and second contingency with the use of fast action resources. CECONY uses maximum transfer levels into New York City of 5,000 MW for the first contingency and historical transfers of 3,000 MW under line out conditions. The use of historical transfer levels complies with NPCC criteria only if fast action resources can reduce transfers to historical levels.

- 9. Planning parameters are either uniform, consistent with practices of other utilities, or consistent with the requirements of regulators with the exception of equipment and line ratings.**
- 10. The Transmission Planning Department is organized and staffed by qualified personnel in both numbers and expertise.**
- 11. CECONY has adequate standards to implement uniform design decision making across the distribution and transmission systems with the exception of equipment and line ratings.**

12. Regional differences appropriately influence the planning processes, guidelines, and standards through different design levels of reliability.

13. Data supplied to planners is consistent, credible, and responsive to planners' needs.

14. There are inconsistencies with the data used in the calculation of equipment rating data.
(Recommendation 4)

Different time durations and ambient temperatures are used in the calculation of ratings for power system equipment.

15. Planning models are sufficient for accurate results and software programs used in planning analyses are state of the art programs that are used industry wide.

16. Deficiencies in network and distribution planning models and software have been identified; they are being addressed. *(Recommendation 5)*

CECONY understands where models or inadequate data may not produce accurate results and takes action to remedy those deficiencies in its analyses. CECONY is also installing new models and correcting data base problems.

17. No analysis that determines what 3G initiatives must be accomplished by what date has been performed in order to minimize costs to customers. *(Recommendation 6)*

CECONY has many concepts and initiatives for the 3G system of the future and has a vision on how they would be integrated. Many initiatives are years if not decades away and will require the expenditure of significant amounts of capital. The least cost expansion scenario has not been determined.

18. Current technology is sufficiently used and considered in the planning processes.

19. Reduction of peak losses is not sufficiently considered in the planning process.
(Recommendation 7)

Liberty found that although CECONY fully understands the relationship of losses on its system to costs, insufficient analysis has been performed to determine the extent that peak loss reduction can defer large system capital investments required in system planning needs assessments.

20. Sectionalization of network feeders warrants further investigation. *(Recommendation 8)*

The outage of a network feeder also causes the outage of many network transformers. The ability to restore some of the transformers with or without a source from the area substation may result in reduced requirements for the number of network feeders serving a network. CECONY is already exploring additional sectionalization of long overhead feeders.

21. Transmission vegetation management practices are compliant with FERC and NYPSC requirements and are a good utility practice.

22. There is not consistent conformity across regions with the new distribution trimming standards. *(Recommendation 9)*

Conformance to new trimming standards generally followed the number of outages occurring in each region and the level of importance placed on trimming by regional management.

23. The 100 percent inspection program of distribution trimming prior to payment is not achieving desired results. (Recommendation 10)

Violations to the new trimming standards were observed in all regions and again followed the level of importance placed on trimming by regional management.

24. There is no base reliability design level for networks. (Recommendation 11)

CECONY uses the median level of its network failure rates as its improvement goal and target. The failure rates of networks vary widely. There is no minimum level of reliability established for new networks.

D. Recommendations

1. Evaluate reliability programs to determine if they should be terminated earlier to release capital expenditures for more cost effective reliability programs. (Conclusion 3)

The reliability across the CECONY system varies widely. Total completion of reliability improvement programs can produce declining and negligible benefits on systems that already enjoy high reliability. Termination of reliability programs on a targeted basis can release capital for other more cost efficient reliability programs.

2. Analyze the 138 kV system designed to N-1 standards to determine the extent that maintenance activities can be performed at load levels less than peak load; where appropriate, incorporate maintenance design requirements into relevant design standards. (Conclusion 6)

The requirement to accommodate maintenance activities heightens in importance when N-1 designed systems are heavily loaded as are those at CECONY. In addition, higher load factors, also exhibited at CECONY, pushes maintenance activities towards the higher load levels further increasing maintenance difficulties.

3. Clarify transmission planning criteria with regard to determination of transfers used during second contingency analysis. (Conclusion 8)

Reliability criteria require that system conditions be adjusted with the use of fast action resources after the first contingency occurs within 10 minutes and prior to subsequent contingencies. Those actions determine the transfer levels to be analyzed under second contingency conditions. The use of anticipated or historical transfers in second contingency analysis may not be in conformance with reliability criteria. Transmission planning criteria should be clarified so that it is clear that fast action resources are used to accomplish the reduction.

4. Perform a global review of all equipment ratings, input data, and time durations across the distribution and transmission areas to assure consistency and to justify and document differences. (Conclusion 14)

Equipment ratings for similar equipment in the distribution and transmission areas should be calculated with consistent input data unless required differences can be justified and documented. In addition, input data should be verified that it is representative of the CECONY system.

5. Maintain the 2011 completion date for completion of network secondary topology updates and EPRI DEW software. (Conclusion 16)

Accurate secondary information tied back to the customer and polyphase tools are essential for accurate analysis and to prepare for integration of smart grid technologies where applicable.

6. Perform a least cost system analysis that minimizes costs to customers with regard to implementation of 3G strategies. (Conclusion 17)

CECONY has a conceptual vision of what the ultimate future 3G system might look like when applied to their unique power system. CECONY has not taken this vision and determined how the concepts embodied within the vision should be employed to minimize costs to customers.

7. Perform analyses to determine if peak demand can be reduced more economically than the addition of infrastructure. (Conclusion 19)

CECONY peak load losses far exceed the average approximate 1,300 MW level (9.73 percent) reported to the NYPSC in July 2008. Analyses should be performed to determine if system demand can be economically reduced versus infrastructure expenditures.

8. Actively pursue the economic use of SCADA controlled network mid-point feeder sectionalizing switches or circuit breakers to reduce system investment. (Conclusion 20)

The ability to re-energize some of the network transformers outaged with the failure of a network feeder may reduce the number of network feeders and transformers required to supply the network, reducing overall cost to customers.

9. Place all distribution tree trimming under a central corporate management function with accountability to corporate management. (Conclusion 22)

Currently there are three organizations performing distribution trimming. Two of those organizations report to the regional manager and their function is secondary to primary construction activities, resulting in less compliance to tree trimming standards.

10. Strengthen the distribution vegetation management inspection program with accountability. (Conclusion 23)

Violations to new trimming standards were noted in all regions even though circuits were 100 percent inspected prior to contractor payment. Violations remaining after vegetation management nullify expenditures to improve reliability.

11. Establish a base level of network reliability for new networks. (Conclusion 24)

CECONY should determine the reliability design level of networks (probability of failure) that will provide a base level of reliability for new networks. The base level of reliability should include no oil filled cables, no Ray Chem joints, only one network feeder on a breaker, and the

elimination of other identified network deficiencies. If considerably different than the median failure rate of existing networks, the network reliability improvement program may need modification.

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IX. System Planning – Gas

Liberty considered planning for CECONY’s natural gas transmission and distribution systems to be a strength. Our principal recommendation is that a 20-year-old study of the rate of infrastructure replacement be updated.

A. Background

CECONY is facing aging infrastructure issues with its gas transmission and distribution systems, as well as with its electric systems. As with the electric systems, growth in requirements necessitates addressing these issues while maintaining a high level of deliveries to customers.

The Company’s gas systems consist of 4,306 miles of main pipelines, plus associated services. As discussed in the Load Forecasting chapter (Chapter VII), the systems serve approximately 1.06 million firm customers, and about 1,200 interruptible customers, seven of which are gas-fired electricity-generating plants. The systems include 84 miles classified as transmission main, operating at pressures greater than 125 psig. The other 4,222 miles of main are classified as distribution main, because they operate at less than 125 psig.

Particular problems for the gas systems generally include: (a) cast-iron mains, and (b) bare-steel and “unprotected” (*i.e.*, lacking cathodic protection) mains and services. The oldest parts of the gas distribution system are made of cast iron, which can crack when stressed by weight from above, or when inadequately supported due to shifting in its burial medium. Bare steel mains and services were installed in the industry well into the 1950s, before recognition of corrosion problems drove development of special coatings and of protection from electro-chemical reactions between the pipe and its burial medium. The parts of most U.S. gas distribution systems installed before 1950 have both of these problems; most gas distribution companies today have active programs to address them. In fact, CECONY’s most recent rate produced agreement with stakeholders agreed that the pace of cast-iron/bare-steel replacement should be increased from 30 miles per year to 40 miles per year.

Liberty examined the planning and execution of CECONY’s programs to meet its customers’ needs in these areas. This chapter addresses planning; Chapter XIV addresses program execution.

Liberty’s examination of planning for the gas system was conducted in six tasks. Those tasks are as follows:

1. Organization and Staffing
2. Analytical Tools and Processes
3. Mains and Services Replacements
4. Drivers for System Enhancement
5. Impact of New Markets
6. Plan Integration.

The criteria by which Liberty evaluated system planning - gas included the following:

- Organization and staffing

- o Organization and staffing for the system planning function in the Natural Gas business must be sufficient for it to be an effective advocate for gas customers in the competition for investment dollars.
 - o Training and experience of gas-system planning staff should be comparable to those at the largest gas-utility systems in the country.
 - o The company's gas-system planning staff should have a quantity and quality of skills commensurate with the scope of their responsibilities.
- Analytical tools and processes
 - o The gas-system planning staff should be expected to have examined industry offerings, and to use the tools best suited to analysis of ConEd's system.
 - o Models, both static and dynamic, should be appropriate for the conditions simulated and their limitations understood by those that use them.
 - o Standard planning parameters should be published and updated as appropriate.
 - o Standard decision-making rules for design options should be documented.
 - o Planning processes, guidelines and standards should reflect regional differences where appropriate.
 - o The performance of the gas system should be examined periodically -- usually annually -- in preparation for the following heating season.
 - o The gas-system planning staff should be expected to conduct other studies as needs arise.
 - o The gas-system planning staff should have a disciplined process for selecting equipment or locations for special study.
 - o Study results should be used to guide investment in the system, both for maintenance and for improvements.
- Mains and services replacements
 - o Cast-iron and bare-steel mains and services should be replaced at a pace that is consistent with protecting public safety.
 - o Mains and services replacements should be guided by leak detection and other measures to ensure public safety, but must accommodate public-works projects as well.
- Drivers for system enhancement
 - o Compliance with pipeline and distribution system safety regulations should provide an overall context within which system improvements proceed.
 - o Leak survey results should routinely flow into the prioritization process for system-improvement projects.
 - o While generally a secondary priority, reliability improvement should be a consideration in the design of every construction project.
 - o The company must apprise itself of all plans for civil construction, so that gas-system improvements can be made as part of each one without jeopardizing progress on the company's priorities.
 - o The company should always have a sense of where the gas distribution system has capacity available, and where new loads might be located, in order that any upgrades required to accommodate the new loads might be planned and executed most efficiently.
 - o The company should always be looking for opportunities to employ demonstrably cost-effective new technologies.

- o The company should have established R&D priorities that can be applied as opportunities present themselves.
 - o The company should be preparing for the new Distribution Integrity Management Program requirements
- Impact of new markets
 - o Inputs to the planning process should be credible and in a form and content compatible with planners' needs.
 - o Corporate planning should advise gas-system planning of major changes in the business environment (e.g., climate-change legislation) that may impact planning.
 - o Gas-system planners should know from interaction with Marketing the types of loads that are anticipated at various locations on the system.
 - o Gas-system planners should know when a major new load or group of loads might impose costs on the system that would be inconsistent with rates that might be charged under the current rate design.
- Plan integration
 - o A long-term master plan should be in place that offers a credible strategy for how the gas system will evolve over an extended period, including expansion requirements, aging issues, reliability goals, growth of technology and other factors important to a long-term planning horizon.
 - o Shorter-term changes to the system should be compatible with longer-term plans.
 - o A strategy should be in place that describes how the system will avoid over-extended lives for equipment and facilities, including an overall repair-versus-replace strategy.
 - o Guidelines for economic evaluations should be in place and uniformly applied.
 - o Policies for weighting the benefits of non-financial attributes should be in place.
 - o A system of prioritization of projects should be in place and uniformly applied.
 - o A structured approach to cost-benefit analysis should be in place, with specific instructions for handling various financial and non-financial benefits.
 - o Decision-making processes should consider risk, preferably in a quantitative way.
 - o Major projects should be specified in a way that permits their subsequent design and installation to be optimally managed.
 - o Mechanisms should be in place to provide planners with feedback on field results that should influence future decisions.

B. Findings

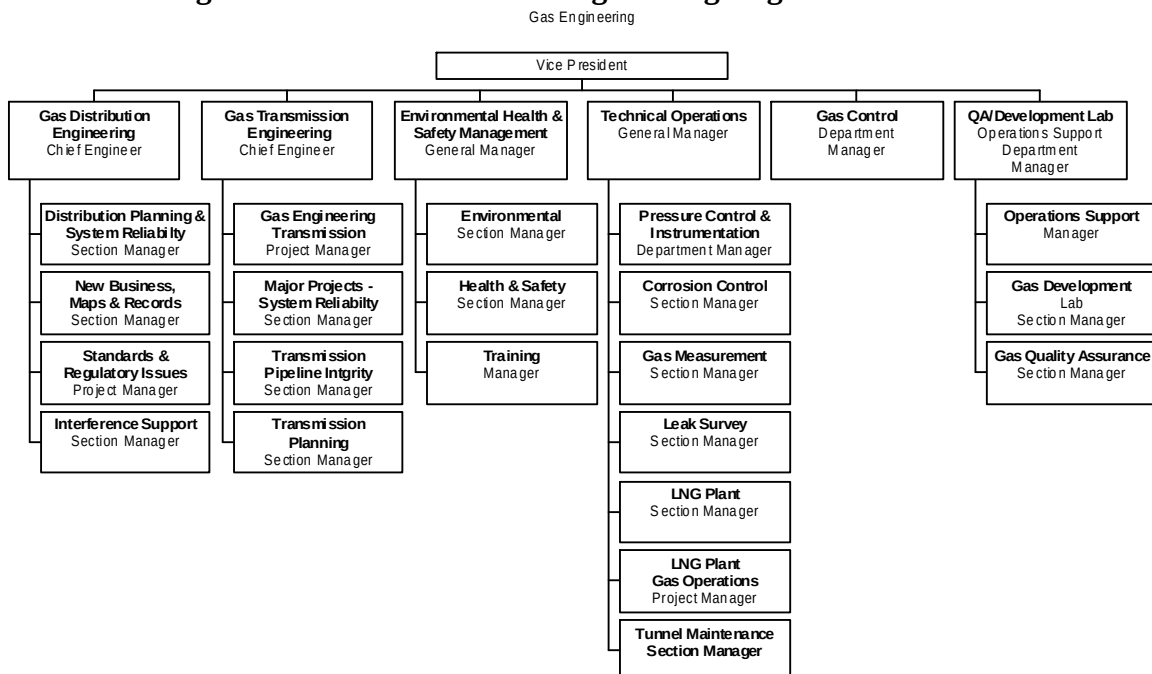
1. Organization and Staffing

CECONY centralized the engineering function for the gas distribution system in 1999. Prior to that, an engineering group operated in each of the four Operating Areas (Bronx, Manhattan, Queens and Westchester County). Another one at the Main Office managed performance standards for materials, equipment, installation, and design and costing processes. The following year, transmission planning, which had been part of Gas Supply, was brought into the centralized gas engineering group.

The group was split into Gas Transmission Engineering and Gas Distribution Engineering in 2005, as part of the Company's response to the new U.S. Department of Transportation's transmission integrity management regulations. Today, the Company's Gas Engineering office

has a Chief Engineer for Gas Transmission Engineering, with five section managers/project managers reporting to him, and a Chief Engineer for Gas Distribution Engineering, with four section managers.

Figure IX.1-.CECONY Gas Engineering Organization Chart



Liberty found engineering resources to be well organized and staffed. Senior managers are well-trained; they have 30 to 40 years of experience with the Company. At the Section Manager level, personnel have advanced degrees (typically MBAs), and 15 to 20 years' experience. Other staff members have engineering degrees, and participate in periodic gas-industry training. Neither Transmission Engineering nor Distribution Engineering are currently using outside engineering firms.

2. Analytical Tools and Processes

Liberty's findings in this task are presented in four parts:

- Analytical Tools
- Analytical Processes
- Procedures and Standards
- Variation among Operating Areas.

a. Analytical Tools

i. SynerGEE Gas Network Analysis Model

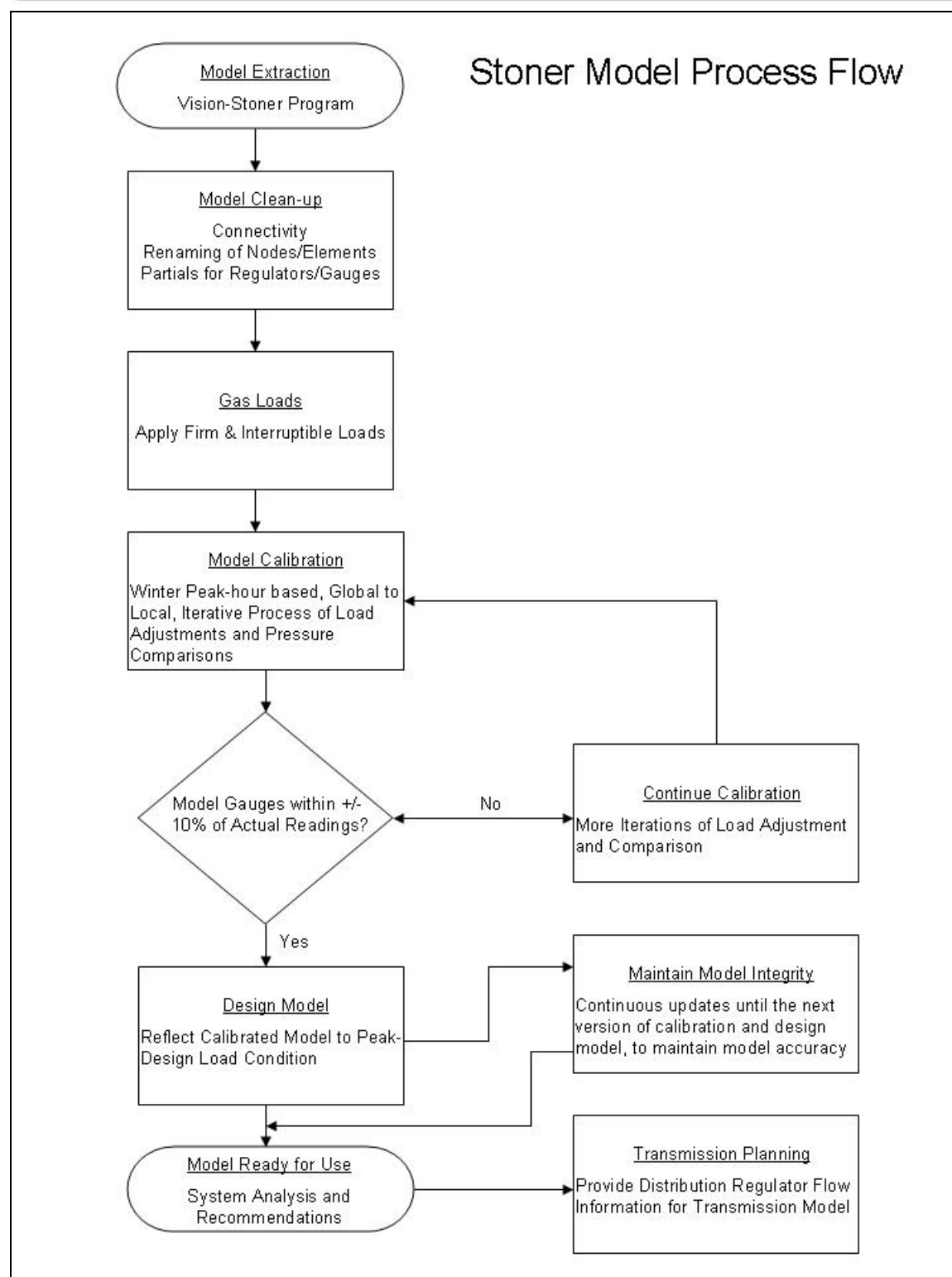
The principal analytical tool used by both Gas Transmission Engineering and Gas Distribution Engineering are system models using the SynerGEE gas network analysis program. This model was developed by a predecessor company named Stoner Engineering. Hence, it is often referred to as "the Stoner Model." It is widely used by the distribution segment of the gas industry. The

model simulates pressures and flows through whatever network is being studied. The flow diagram on the next page illustrates the process for updating and running the model.

Gas Transmission Engineering uses the model to study the transmission system. Flows are examined under winter-peak conditions, when the space-heating load is highest, and under summer-peak conditions, when the system is delivering large quantities of gas to electricity-generating facilities. Contingency studies are also conducted under both sets of peak-load conditions to assess the consequences of losing a gate station, catastrophic line breaks, or loss of other key facilities. These studies are used to identify contingency response actions and reinforcement projects that would minimize or eliminate the impact of the potential loss.

Transmission system studies are also performed in conjunction with Electric System Operations (and the Independent System Operator for the State of New York, or NY ISO), and with the planners for the Steam Business Unit. For Electric System Operations, a key activity is identifying the minimum oil burn requirements for gas-fired generating stations. If gas service is lost or must be curtailed to these facilities, a period of notice is required to allow the stations to switch from gas to fuel oil (typically distillate fuel oil). Air-quality considerations may also limit the duration of any fuel-switch action. The Steam Business Unit is also affected by limits on fuel-switching, as some of its facilities supply electric power as well as steam. The Steam Business Unit faces retirement of certain of its steam-production facilities over the next few years. Gas transmission-system studies assist in evaluating the alternatives for replacing the facilities being retired.

Gas Distribution Engineering uses the model to analyze the behavior of the distribution system, primarily under winter-peak conditions. The model's set up every fall incorporates the improvements to the distribution system that have been completed over the preceding summer, and loads that have been added since the last update. Anticipated loads from new business are added, and then analysis of pressures and flows occurs, to ensure that service levels can be maintained. Valves and regulators settings for the winter depend on these runs. After the heating season, CECONY runs the model again, to compare actual flows with predicted ones. Figure IX.2 demonstrates the model process flow.



Distribution Engineering simulates the high-, medium- and low-pressure distribution systems in each of the Gas Business Unit's (GBU's) four Operating Areas separately. The simulation represents points of interconnection between systems operating at different pressures as points of supply, from the higher-pressure system to the lower-pressure one, or as loads when considering the behavior of the higher-pressure system.

Throughout the year, CECONY performs studies off of the basic runs to analyze new business requests. Also, system reliability/risk studies are performed, including loss of a gate station; loss of other critical supply assets, such as supply mains or distribution regulators; studies of remotely operated valves, to determine where additional ones can be installed to isolate critical areas of the system; etc. The results of these studies are used to develop system-reinforcement plans that will eliminate, or significantly reduce, customer outages under the scenarios studied.

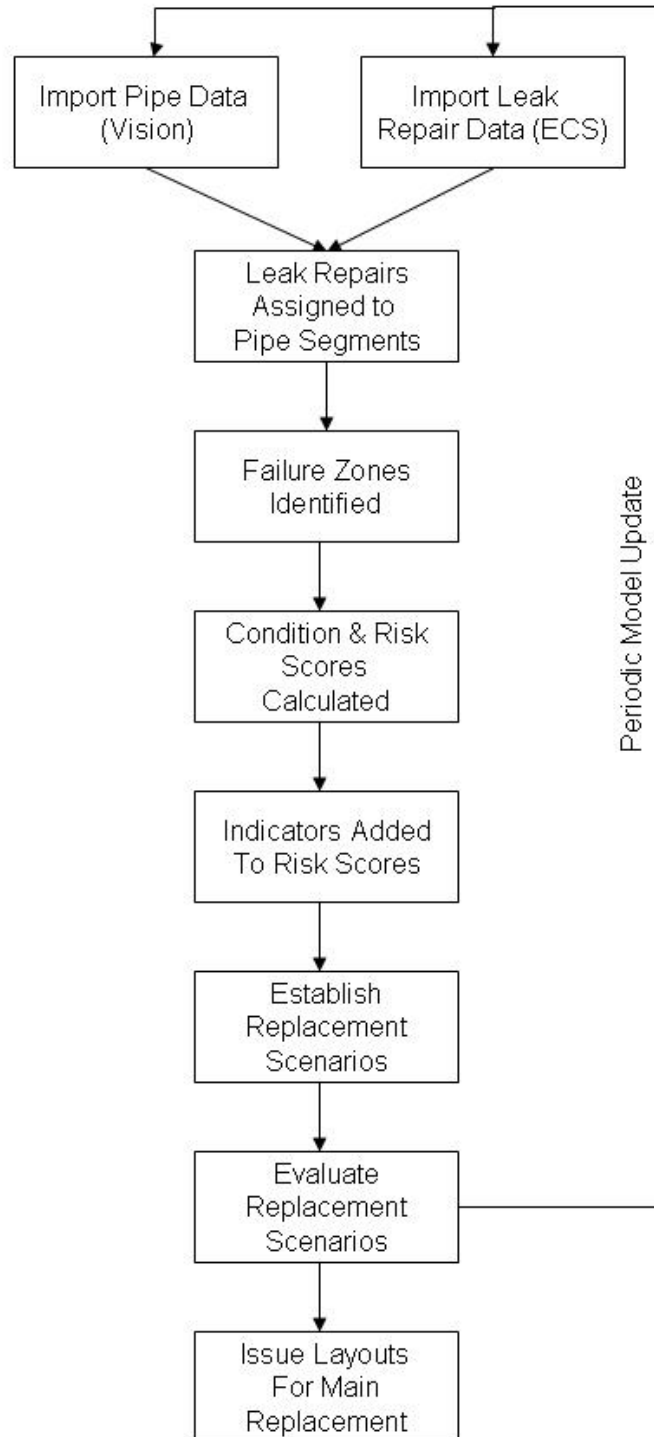
ii. Mains Replacement Prioritization Model

The other principal analytical tool, used primarily by Gas Distribution Engineering, is the Mains Replacement Prioritization (MRP) model. The MRP model can prioritize unprotected steel or cast-iron main replacement by condition or by risk, or by a combination of both. The flow diagram on the next page illustrates how the MRP model is used.

The model calculates Condition Scores and Risk Scores for every segment of main. A segment of main is defined as a piece of pipe with the same properties: same age, same material, same installation technique, and same burial medium. The length of a segment varies. The Condition Score is an estimate of future leakage of each segment of pipe, calculated as leaks per mile. Attributes such as pipe diameter, age, material, and leak history go into the calculation. The model also calculates a Background Failure Zone value for each segment, which also goes into the Condition Score. The Background Failure Zone value comprises a tabulation of leak rates on other pipes within a 300-foot radius of the segment being assessed. The calculation of Condition relies on statistical models developed in the United Kingdom from an analysis of more than 87,000 miles of main and 15 years of leak repair data, focusing on bare-steel and cast-iron mains.

The Risk Score provides an estimate of potential incidents on each segment. It is measured in incidents per unit of length per year. The Risk calculation uses factors such as: (a) the likelihood that gas will enter into a building, and (b) the likelihood that, having entered the building, the gas would ignite. These two factors are called the Gas Ingress Factor, and the Gas Consequence Factor, respectively. Additional risk indicators include location; *e.g.*, school or hospital proximity, and "geography;" *e.g.*, an area of unstable soil. These indicators are customized for each user of the model, and are used to adjust (usually increase) the Risk Score of affected segments. Figure IX.3 is shown below.

MRP Process Flow



The MRP model provides effectively a way to use leak and location data quantitatively in prioritizing segments of main for replacement. Steel main replacements tend to be prioritized on the basis of Condition Scores, whereas cast-iron segments tend to be prioritized on the basis of Risk Scores. Other considerations, such as public- and private-sector construction (referred to by CECONY as “interference”) and load relief, come into final decisions about which segments to replace in what order. *Load relief* is a term used broadly by CECONY to refer to system reinforcement projects that provide greater capacity at a particular location. Further development of MRP model capabilities, however, promises a more systematic assessment of risk in the prioritization process.

b. Analytical Processes

The GBU’s system-planning process relies primarily on flow studies produced with the SynerGEE model. The studies have different time horizons and different scope, depending on the problem being assessed. Principal problems studied include the following:

- *Accommodating new loads:* The addition of each large-volume load is simulated with the model to ensure that it can be served without compromising service to other customers. Also, prior to each winter, all new loads connected since the last calibration of the model are added in the same model run, again to ensure that their addition does not compromise service to other customers.
- *Winter preparation:* In the fall of each year, model updates account for new loads added since the last calibration run, and for system-improvement projects completed during the construction season. Flow studies assist in preparing the system for winter operation.
- *Model calibration:* After the winter, recorded pressures and flows are compared with those predicted by the model before the winter. Adjustments are made to calibrate the predicted flows with the measured ones, in preparation for simulation work for the remainder of the year.
- *Special studies:* As noted earlier, the model is used throughout the year for special studies. Subjects studied include minimum oil burn for electricity-generating facilities, reliability studies for the Gas Business Unit, and options studies for the Steam Business Unit, for example.
- *Long-term planning:* As discussed in more detail below, the GBU has developed a long-term plan for the transmission and distribution systems. Beginning with a set of objectives for the performance of the system at a point in the future (2025), a series of studies have identified and roughly configured system improvements necessary for attaining the stated objectives. As the identified improvements get installed, flow-study updates incorporate those improvements, and re-check priorities and configurations for further improvements.

The GBU’s planning processes also include prioritization of main replacements, using the MRP model described above. CECONY structures the main replacement program as an amount of money budgeted for that purpose each year. The four Operating Areas carry out main replacement projects, in order that they might be integrated with each one’s planning for Interference projects. Gas Distribution Engineering uses the MRP model to prioritize projects across the Operating Areas, and then within each Area.

c. Standards and Procedures

CECONY has long had well-documented procedures and specifications for its gas transmission and distribution systems. The Master Index of those standards covers some 23 pages. After the Engineering function was centralized, however, the new group developed a single document that specified design criteria for the systems going forward. The various procedures and specifications in the other documents still apply; the new document, in line with the GBU's Long-Term Plan for the systems, focuses on performance objectives for them.

Employees can access all of the standards and specifications on-line. They are kept current by: (a) the Standards and Regulatory Issues group that reports to the Chief Engineer, Gas Distribution Engineering, and (b) the Transmission Planning group within Gas Transmission Engineering. Most standards are updated at least every five years; ones involving liquefied natural gas are updated every two years. Equipment specifications are updated as new information becomes available, including information from CECONY's own Research and Development group, and its own Development Lab, which tests materials and components. CECONY incorporates "Lessons learned" from installation experience into the on-line manuals through the periodic updates. Quality assurance audits of completed work comprise another important source for updated specifications. Personnel relevant to each standard or specification get an e-mail message when each one is updated.

d. Variation Among Operating Areas

The distribution systems in the four Operating Areas operate at pressures different from each other. Valves and regulators connect them, but each system requires separate simulation and analysis.

Before centralization of the Engineering function in 1999, each of the four handled much of the maintenance and upgrade activity independently. A central Engineering group at the Company's Main Office maintained the written procedures and standards, but each of the Areas applied those procedures and standards independently.

An important objective of centralization was to reduce variation among the Areas where doing so was beneficial. Centralization provided synergies in mapping and record-keeping, for example, and allowed project prioritization across the four Areas.

Today, the four Areas continue to manage construction projects for system reinforcement, attaching new business, and cast-iron and bare-steel mains and services replacement. Transmission projects and some larger distribution projects, are configured by the Major Projects group in Gas Transmission Engineering, and then contracted out by the Construction group in Central Operations. The Operating Areas continue to manage the majority of system-improvement work, however. Gas Distribution Engineering provides assistance with flow studies and with prioritization of main-replacement projects, but the Areas carry out the projects, some with contractors and some with their own employees.

This arrangement is necessary to facilitate integration of gas-system work with "Interferences," which consist of public- and private-sector projects (typically construction) that affect the gas

system. The work schedules for these projects must be coordinated with those for the gas distribution system, in order to avoid duplication and increased costs. Each Operating Area has a group that tracks this activity, so that each one can adjust its project schedules and scope as necessary to accommodate such work. Liberty understands that this is the Public Improvements group, which is organizationally part of Construction Management in Central Operations, but which has a “branch” in each of the Operating Areas.

There is coordination between the Operating Areas and Engineering. Construction managers and supervisors are in frequent contact with Engineering as the work proceeds, and managers from the four Areas meet monthly with Engineering to discuss their experience, both progress and problems. This coordination might be strengthened, however, and provides a recommendation in this area in the Chapter XIV; *Project Management – Gas*.

3. Mains and Services Replacements

CECONY, like other utility companies that maintain distribution systems installed before 1950, has an active program for replacing its cast-iron and bare-steel mains and services. CECONY reports that, since 2000, it has replaced over 1.2 million feet of this piping.

Prioritizing mains and services for replacement generally relies on leak-repair data. The Company reports that, prior to 2006, replacements were prioritized with the help of an algorithm that looked at the number of repair clamps installed within a certain length of pipe. In 2005, however, the Company began testing Advantica’s Mains Replacement Prioritization model, described in the previous section of this chapter. That model supplements leak-repair data with other parameters known to influence pipe condition, such as age, diameter, material, operating pressure and burial medium. It also provides a way to explicitly consider risk in the prioritization process.

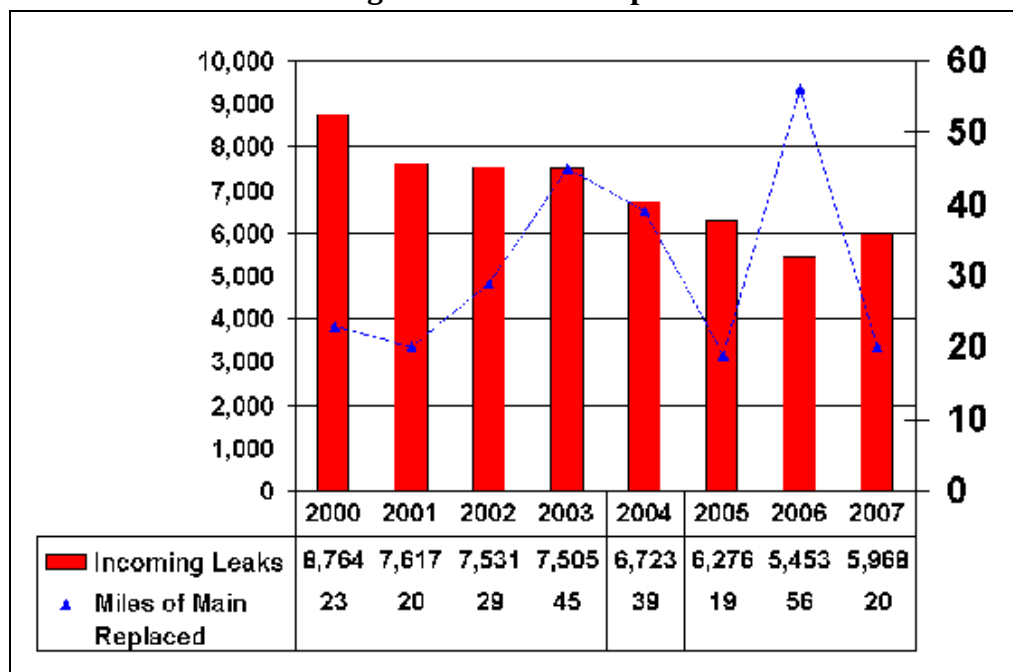
“Exogenous” factors enter the prioritization process at the point of project selection and configuration for the coming construction season. Main-replacement projects in areas that are experiencing “interference” (public- and private-sector construction projects) are usually advanced to coincide with the interference projects, in order to minimize costs. Any main-replacement projects required for safety or environmental compliance are similarly advanced. A main-replacement project located near other high-priority projects might also be advanced, again in search of cost savings. Other high-priority projects might include ones required for load relief.

The pace of main replacement is also driven by leak rates. Industry experience has shown that, without replacement, leak rates, and the expense associated with repairing leaks, will increase continuously. A central question for every distributor with this problem is, how quickly must main replacement proceed in order to keep the leak rate (and associated repair costs) from increasing. In 1988, a CECONY outside consultant considered this question for bare steel mains. The consultant studied the Company’s system and recommended a cost-effective replacement program designed to “levelize” leak rates.

CECONY’s leak rate has been coming down. The following figure shows leak reports (left scale) and a line graph of main replacements (right scale) since 1999. On the basis of those trends, the Company proposed in its most-recent rate case to continue to replace about 30 miles per year. In

the course of that case, however, CECONY and the interested parties agreed to increase replacement to about 40 miles per year. CECONY reports that it is on track to reach that level of replacement in 2008.

Figure IX.4- Leak Reports



4. Drivers for System Enhancement

Liberty's findings in this area are presented in five parts:

- Pipeline and Distribution System Safety Regulations
- Leak Surveys
- Public Improvement/Interference
- Reliability Improvement
- New Technologies/Research and Development.

a. Pipeline and Distribution System Safety Regulations

Compliance with safety regulations is perhaps the most important driver for CECONY's investments in its gas transmission and distribution systems. The Company's priorities for O&M budgeting begin with pipeline integrity inspections; its priorities for capital budgeting begin with any capital projects that result from those inspections. The second and third priorities in both cases (capital and O&M) are projects mandated by Federal and State pipeline safety regulations, and compliance with other safety and environmental regulations.

These priorities are illustrated by the following priority list. That list is taken from the Company's guidance to its staff for prioritizing capital projects for the 2009 Budget. The list for prioritizing O&M projects is similar.

Capital Plan Prioritization

Priority 0 - (Non-Discretionary)

Includes Types:

- a. Urgent capital work resulting from pipeline integrity inspections
- b. Public Improvement/Interference
- c. Meter purchase and installation (both mandated replacements and new business)
- d. Jobs currently in construction

Priority 1

Includes Types:

- a. Safety and environmental compliance projects
- b. Code mandated
- c. Projects that need to meet current design criteria for reliability
- d. Regulatory commitments
- e. Committed new business projects
- f. Type 1, 2, 2A leaking services
- g. Emergency replacements
- h. Tunnel integrity projects
- i. Security projects

Priority 2

Includes Types:

- a. Safety and environmental enhancement projects
- b. Life extension projects such as main and service replacement based on failure model analysis and/or historical trends
- c. Productivity enhancements
- d. Replacement of obsolete equipment and facilities
- e. New business projects that could be deferred if necessary
- f. Projects that needed to meet the design criteria within the next three years
- g. Projects that need to meet future design criteria

Priority 3

All other projects such as facility improvements and technology upgrades

Recently, the U. S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) issued regulations for pipeline integrity management programs subject to its jurisdiction. Similar regulations for distribution-system integrity management are nearing issuance. In both cases, CECONY reports that the Federal requirements provide a compliance framework and record-keeping requirements, but largely prescribe activities that the Company already conducts. CECONY has been, and is continuing to, participate in industry groups formed for the purpose of advising the Federal government regarding the programs. The Company therefore has an understanding of what to expect by the time that the programs are finalized. In the distribution integrity management program that is now being finalized, CECONY expects a new requirement for risk assessments; the Company is confident that the risk-assessment capabilities of its new Mains Replacement Prioritization model will handle any such requirement, however.

b. Leak Surveys

There is a clear relationship between the number of leaks and the rate of gas-main replacement: the faster the replacement, the lower the leak rate. The role of leak-survey data (and other leak reports) in CECONY's system investment lies in prioritizing the mains-replacement program. Leak repair data has long laid a foundation for prioritization, but more qualitatively (locations plotted on a map) prior to introduction of the Mains Replacement Prioritization (MRP) computer model. The important advance with the model consists of using leak repair data to identify locations with a high probability of failure.

Leak survey data drives leak repairs; as do leak reports from customers and the public. Leaks found get reported to the Company's Gas Emergency Response Center. From there, the report goes to a mobile data terminal in the vehicle of an employee of one of the four Operating Areas. The employee conducts a leak investigation, which starts the leak-repair process. Leak-repair information, rather than the leak report itself, drives the mains-replacement prioritization process because the nature of the leak, and the condition of the pipe at the location of the leak, both of which are revealed when the leak is repaired, are important inputs into that prioritization process. Leak-repair information is reported through formal records, but also through telephone contact, in order that Engineering might have access to first-hand information about pipe condition.

c. Public Improvement/Interference

The Capital Plan priority list shown earlier in this chapter also makes clear the very high priority afforded capital projects that are driven by civil, and some private, construction. Coordination with civil construction is critical to cost and schedule control; therefore, CECONY expends considerable effort incorporating plans for civil construction into its own planning.

Each of the four Operating Areas has a Public Improvements group responsible for obtaining information about the construction plans of the various civil authorities. The Public Improvements group communicates those plans to appropriate planning bodies within the Company. Key players include:

- Construction Management group within Central Operations
- Energy Services, located organizationally within Electric Operation
- Interference Support within Gas Engineering.

The Company has a special procedure, Gas Operations Standard No. G-11822-8, *Repairs and Improvements on the Gas System Prior to Street Reconstruction or Repaving Projects*; it specifies the distribution of responsibilities for this activity.

About 10 percent of the capital expenditures in each of the three years of the recent rate settlement *i.e.*, more than \$32 million per year) goes to Interference-related capital projects. Clearly, the Company uses the occasion of civil construction to enhance its own system as its system is affected by that construction.

d. Reliability Improvement

The Company reports that it incorporates reliability considerations into every capital project. Specifications for capital-project design ensure that projects are designed and installed to standards that incorporate reliability considerations.

Reliability improvement is also a key objective of the Company's long-term plans for its transmission and distribution systems. Stated objectives for both of those plans include specific reliability improvements; thus, each year's capital projects are identified and configured to provide reliability improvements if possible.

e. New Technologies/Research and Development

CECONY maintains both a Development Lab, which the GBU uses for testing materials and components, and a Research and Development (R&D) group, to which the GBU refers particular problems. The high costs of most physical activities involving CECONY's gas transmission and distribution systems, combined with the GBU's extensive agenda of improvements to the systems, makes the GBU an eager client for both groups. Capital-project design and specification rapidly incorporate materials and components that successfully complete Development Lab testing. The same is true for new technologies that are identified by the R&D group. To the extent that they deliver savings in installation, or a superior finished product, an array of new technologies can (and does) quickly find their way into key components in the ongoing improvements being made to the Company's gas systems.

5. Impact of New Markets

The background load forecast used for system planning by Gas Transmission Engineering and Gas Distribution Engineering is a 20-year forecast that received from Gas Supply. The current forecast shows an increase in firm throughput of about 10 percent over that period. For system planning purposes, they must assume that "background" firm loads; *i.e.*, small- to medium-sized residential and commercial loads, grow largely where they already exist. Flow studies identify areas where additional capacity is required to accommodate the growth, and system-reinforcement projects are designed to provide the necessary capacity.

Larger-volume new loads undergo individual study. Contractors, customers and CECONY's own Marketing & Sales group submit new requests for gas service to the Energy Services group. Energy Services is located organizationally within Electric Operations. Energy Services has representatives located physically in each of the Company's Operating Areas. Energy Services coordinates the delivery of all of CECONY's services to larger-volume customers. Energy Services forwards these requests to Gas Engineering for evaluation. Gas Engineering conducts flow studies to determine whether the existing system will handle the new load, and what (if any) improvements will be needed. The difficulty in siting any gas-using facility large enough to affect flow patterns (such as an electricity-generating facility) is such that the Engineering groups would have ample time to evaluate what improvements (if any) would be required to provide the required level of service. CECONY would likely construct any required improvements at the same time as the gas-using facility that drives the requirement.

Other potential additional demands on the gas transmission and distribution systems also undergo individual study. An earlier part of this report chapter discussed the numerous studies that the Engineering groups perform for CECONY's Electric System Operations and the New York ISO, and for CECONY's Steam Business Unit, in order to support system planning.

Recent changes in oil-to-gas price relationships and in incentive programs for conversion from oil to gas may bring additional demands on the gas transmission and distribution systems. In 2007, for example, the New York City Housing Authority elected to convert all of its residential facilities to firm gas service. As discussed in Chapter VII; *Load Forecasting*, these changes may bring revisions to the background load forecasts that the Engineering groups use for their flow studies. Prospective loads of significant size will continue to be studied individually, however.

The Engineering groups do not conduct studies of possible changes in use of the gas systems due to major changes in the business environment, such as might occur with the passage of climate-change legislation, for example. The Engineering groups are not equipped to assess how such "environmental" changes might affect CECONY's business. As discussed in Chapter III; *Planning*, such assessments should be the province of the Company's corporate planning functions. If they were to prepare such assessments, the Gas Engineering groups could readily evaluate the consequences of the changes for the Company's gas transmission and distribution systems.

CECONY's Gas Tariff, which has been worked out over time among the Company, the NYPSC and the Company's stakeholders, addresses responsibility for the costs of extensions of the Company's system that may be required in order to provide service to new customers. As is common in such provisions, a basic allowance for these costs exists in base rates; costs in excess of that allowance are charged to the customer, but can be offset by revenues realized from all customers connected by a new extension. Therefore, new connections must be designed and costed out, which requires application of the Company's standards for design and installation of its systems. That work is done by special sections within Gas Transmission Engineering and Gas Distribution Engineering. Those staffs are experienced in designing system extensions that are fair to both new and existing customers.

A major new use of the gas systems that may be forthcoming is electricity generation in the winter. To date, the gas-fired generation that is served by CECONY's gas transmission and distribution systems has been served with an off-peak firm service. That service allows the Company to interrupt those customers for up to 720 hours (30 days) each year. While the generators have paid 100 percent of the costs of reinforcing the gas transmission and distributions systems for the loads that they impose, the required reinforcements have been limited, as they can be interrupted as the gas systems get full. Now, the NY ISO is conducting a study to determine whether (and how much) new gas-fired generation should be located in the City (and thus be served by the Company's gas systems) in order to provide reliable electric power on an average winter day (average temperature of 20 degrees Fahrenheit). If such generation is required, additional expansion of the gas systems may be needed to meet applicable design criteria for both electricity generation and natural gas service. Liberty found the Gas Engineering staffs sensitive to the cost-incidence implications of a requirement for expansion, and Liberty would expect them to resist having gas customers bear inappropriate costs.

6. Plan Integration

Liberty's findings in this task are presented in five parts:

- The Master Plans
- Economic Evaluations
- Non-economic Considerations
- Project Prioritization
- Integration of Installation Experience into Planning.

a. The Master Plans for the Gas Transmission and Distribution Systems

The Company has developed Master Plans for both the transmission and distribution systems. The bases for the two Plans are vision statements that articulate performance objectives for each of the two systems that are to be attained by 2025. Objectives for the transmission system include the following:

- Replace segments of the system that operate at greater than 20 percent of Specified Minimum Yield Strength, to allow operation of the system at a more uniform pressure
- Meet new electric generating load requirements
- Maximize overall supply flexibility and reliability
- Improve gate station deliverability
- Eliminate bottlenecks
- Improve contingency mitigation, such as the ability to lose a single major gate station.

Objectives for the distribution system differ between the New York City Operating Areas and Westchester County:

- New York City:
 - Extend existing systems to meet loads
 - Eliminate piping constraints
 - Provide reliability and contingency tie-ins to large-sized radial systems.
- Northern Westchester County:
 - Replace gas mains in corrosion-prone areas
 - Install ties between Peekskill, Cortlandt and Yorktown systems to improve reliability.
- Southern Westchester County:
 - Replace gas mains to address capacity constraints and corrosion.

Each of the Plans includes a list of system-improvement projects prioritized in terms of each project's contribution to one or more of the performance objectives for the system that it would serve. The Company expects to install each project as budgets and other forces (such as interferences) allow.

The Master Plans go out to 2025, but ongoing planning activities focus on the next 10 years. Basic studies examine growth in the firm load over that period, plus reliability improvements that have been identified as part of the long-term planning process, such as enabling the systems to lose a gate station on a design day (average of 24 hourly temperatures equals zero degrees Fahrenheit).

Each year's Business Plan begins with the Vision statements from the long-term plans, and identifies issues that are to be addressed in the current year. The Gas Operations Business Plan for 2008 contained specific goals. The 2008 Plan also contained an assessment of progress toward stated goals for 2007. Goals existed for:

- Public & Employee Safety Programs
- Employee Development
- Emergency Response
- Regulatory/Environmental Excellence
- Increased Customer Demand
- Reliability
- Strategic IT Enhancements
- Efficiency/Process Improvements.

Each year's Business Plan also contains brief descriptions of the programs in each of the listed areas that will be conducted in an effort to attain the stated goals. Capital and Operating Budgets for each program also form part of each year's Business Plan. Other materials provided to Liberty indicate that Gas Operations conducts periodic assessments of its progress toward attainment of each goal through the course of each year.

These plans effectively subsume a strategy for coping with CECONY's aging infrastructure issue. Both long-term plans (transmission and distribution) contain schedules for dealing with gas main replacement. The Company's articulation of the plans in terms of performance objectives, rather than work activities, allows the Company to incorporate improved equipment and methods as they become available, rather than re-writing the plans every time a particular technique or piece of equipment changes.

b. Economic Evaluations

The Company's guidance for the Capital Budget Process, CI-610-1, includes a specification for economic evaluation of projects presented for authorization. Specific to Gas Operations, the Gas System Design Criteria, specification G-8051, provides economic guidance as well as design principles to meet all code requirements. Cost-effectiveness is itself a design criterion, and project configuration is expected to include evaluation of alternative components on the basis of cost-effectiveness. Other economic considerations used in gas system design and planning are detailed in particular specifications for performance of the system.

The majority of the GBU's projects are for load relief, reliability, or main replacement. There are some, however, that are classified as "cost savings" initiatives. These require special economic evaluation. For those, the Company's Corporate Instruction CI-291-1 prescribes guidelines and responsibilities for cost/benefit analysis.

Cast-iron and bare-steel mains and services replacement comprises a substantial segment of the current capital budget – almost 17 percent in 2008. Main replacement projects are prioritized using leak-repair data and the Mains Replacement Prioritization computer model, as discussed

above. The rate of main replacement, and thus the rate of expenditure, is determined in the Company's rate agreements with its stakeholders.

c. Non-economic Considerations

Both the long-term Master Plans for the transmission and distribution systems, and the design criteria that apply to specific projects for improvements to those systems, incorporate non-economic considerations. The Master Plans establish goals for the performance of the systems, including, for example, reliability goals. The design criteria have specific standards for performance, in areas such as operating pressures, valve installations, and contingency analysis, for example. Moreover, the stated Gas System Design Criteria contain particular (non-economic) milestones for the performance of the transmission and distribution systems: all intermediate-pressure cast-iron gas mains 8 inches and smaller in diameter shall be replaced or downgraded by 2010, for example.

Public safety, a non-economic consideration, has considerable significance in the system-design and improvement processes. Within each year's complement of main-replacement projects, the Company has always used leak and leak-repair data to prioritize projects. Current efforts in implementing the new Mains Replacement Prioritization model are focused on more quantitative assessments of that data, in order that the prioritization process might result in the maximum possible reduction in risk to the public for the replacement monies spent.

The corporate-side Enterprise Risk Management (ERM) program identifies both operating and non-operating risks, and quantifies them according to relative severity for risk-management and planning purposes. Write-ups provide descriptions of the risks, the departments responsible for controlling them, and the programs and projects that the Company has to address each one. On an annual cycle, Gas Engineering reviews and considers all identified risks prior to the start of the budgeting process. Also, each month Gas Engineering evaluates changes in its business, environment or expectations that may create new risks, or change the significance of existing risks.

In both the annual process and the monthly reviews, the Company's ERM Team evaluates each risk on the basis of severity, likelihood and controllability. Each organization within the Company is required to address its risks in its budgeting process. If a particular gas-system improvement project is perceived to reduce enterprise risk, it may receive a higher priority in the budgeting process.

d. Project Prioritization

Corporate budgeting guidance for all three of the utility businesses includes a system of priorities for both capital projects and operations and maintenance activities. The priority list for capital projects for the Gas Business Unit is reproduced in the figure above.

For the gas systems, system-improvement projects are selected using the network-flow models described in an earlier part of this section. All projects selected are then designed to conform to the standards specified in the Gas System Design Criteria. The prioritization processes

established in the budgeting guidance are then applied to determine which projects will get done in the current year, and which will wait for later.

Gas main replacement utilizes a different process. The total annual budget for gas main replacement is determined in the GBU's rate proceedings. Projects to be completed in the current year are selected on the basis of leak and leak-repair data, as discussed above. Interference from private- and public-sector construction can affect priorities if construction projects are located in areas of interest for main replacement, but prioritization has generally been on the basis of estimated reduction in leaks. Full implementation of the Mains Replacement Prioritization model will allow more explicit consideration of risk in the prioritization process.

e. Integration of Installation Experience into Planning

Operating-area personnel meet with Distribution Engineering monthly to discuss their experience carrying out main-replacement and system-improvement projects. Feedback from these discussions, plus intelligence derived from Engineering's visits to field installation sites, is incorporated into project design.

Transmission Engineering has a Major Projects group that is responsible for detailed design of major transmission projects. A major focus of this group's efforts is incorporating installation experience into project design and execution.

C. Conclusions

Organization and Staffing

1. Organization and staffing for CECONY's gas system planning function are appropriate.

Liberty concludes that:

- Organization and staffing for the gas system planning function is sufficient for it to be an effective advocate for gas customers in the competition for investment dollars
- The training and experience of gas-system planning staff are comparable to those at the largest gas-utility systems in the country
- The Company's gas-system planning staff has a quantity and quality of skills commensurate with the scope of their responsibilities.

As noted in the Findings section of this chapter, these conclusions are based on Liberty's reviews of position descriptions, resumes and other organizational materials submitted by the Company in response to our data requests, and on our interviews of senior managers and other personnel.

Analytical Tools and Processes

2. The analytical tools used in the gas system planning function are appropriate.

Liberty discussed analytical tools used by gas-industry planners with CECONY's Section Manager, Distribution Planning & System Reliability, and its Section Manager, Transmission Planning, and concludes that:

- The planning staff examined industry offerings, and selected the tools best suited to analysis of CECONY's system.

- The models used are appropriate for the conditions simulated and their limitations are understood by those that use them.

These conclusions are based on our discussions with the two Section Managers, and our knowledge of offerings in this area.

3. The GBU's documentation of decision rules and parameters for planning are appropriate.

CECONY uses a master statement of design criteria to record its objectives for the performance of its gas transmission and distribution systems, and complements that statement with extensive statements of specifications and standards. The statement of criteria and all of the specifications and standards are available on-line for ready access by Engineering and Operating personnel, and are routinely updated.

4. Periodic and special studies are conducted appropriately and results guide investments in the transmission and distribution systems.

Gas Distribution Engineering conducts flow studies in the fall, to incorporate system improvements during the preceding construction season, and after the heating season, to calibrate the model for further evaluations throughout the succeeding months. The Mains Replacement Prioritization model is used in the early spring to assist the operating areas with prioritization of their work programs for the construction season. Gas Transmission Engineering conducts numerous special studies for Electric System Operations and the NY ISO, for CECONY's SBU, and for the GBU. All of these studies are used to guide system investment, both for maintenance and for improvement.

5. Planning processes, guidelines and standards reflect regional differences where appropriate.

Flow studies must be conducted separately for each of the Company's Operating Areas, as the distribution systems are different. Mains Replacement Prioritization studies also reflect regional differences appropriately, as location-specific parameters, such as pipe characteristics and burial-medium characteristics, are part of the analysis process. The Operating Areas conduct much of the maintenance and upgrade work independently, but supported and coordinated by the central Engineering groups.

Mains and Services Replacement

6. CECONY does not maintain the information it will need to make future evaluations of main replacement. (Recommendation 1)

As showing in Figure IX.4 distribution-main replacement has varied from 19 to 56 miles per year over the period 2000 to 2007. The average replacement rate during that period was a little over 31 miles per year. The rate of incoming leak reports generally declined over the period, from 8,764 in 2000 to 5,453 in 2006, but increased to 5,968 in 2007, the year after the peak in miles replaced.

An important question for gas distribution companies with old systems to ask themselves is how quickly they have to replace mains in order to keep the leak rate from increasing? Liberty acknowledges the existence of recent Commission guidance on the question of pipe replacement

rates. Going forward, however, the replacement program, (like any other source of major expenditures over a long term) should be subjected to regular evaluation of program results and effectiveness. Not only will results from this program be subject to uncertainty, so will all other system needs as years pass. CECONY last analyzed this question in 1988. Moreover, that study covered only bare steel, rather than all three categories of “leak-prone” pipe: bare steel, cast iron and certain types of plastic pipe. Reasonably current information addressing all categories of leak-prone pipe will be important in the coming years.

7. CECONY’s mains and services replacement program is guided by leak repair data, and by public-works projects.

CECONY’s prioritization of its mains-replacement program has always used its leak-repair data; the new Mains Replacement Prioritization computer model uses that data in a different way, plus it considers other data relevant to establishing the risk associated with each system segment.

While the initial prioritization is based on leak data, the final project selection in each year takes “interferences” into account. Project priorities are adjusted in order to reduce costs, and to avoid traffic disruption.

Drivers for System Enhancement

8. Compliance with pipeline and distribution system safety regulations provides an overall context for system improvements.

Pipeline and distribution safety inspections have the highest priority in O&M budgeting, and capital projects that result from those inspections have the highest priority for capital budgeting. Projects necessary for compliance with pipeline-safety regulations and other environmental and safety regulations have the second-highest priority in both budgets.

9. Leak survey results flow into the prioritization process for system-improvement projects.

Leak survey results and reports from customers and the public result in leak repairs. Reports from leak repairs are a key input into the mains-replacement prioritization process. In the past, the use of the leak-repair data was somewhat qualitative. With the new Mains Replacement Prioritization computer model, leak repair data will be used to predict where the distribution system is likely to fail, and those predictions will guide prioritization of projects within the mains-replacement program.

10. The Company is preparing for the new Distribution Integrity Management Program.

The Company is informing itself of likely requirements under the forthcoming Distribution Integrity Management Program by participating in industry groups formed to advise the Federal government regarding that program. The Company did the same thing for the Pipeline Integrity Management Program, implemented recently. From those participations, the Company has a good idea of what to expect under the new program, and is adjusting its distribution-system safety and inspection activities accordingly. The new Mains Replacement Prioritization computer model is expected to address effectively anticipated new requirements regarding risk assessment.

11. Reliability improvement is a consideration in the design of every construction project.

CECONY maintains a suite of manuals that contain specifications for construction and operation of its transmission and distribution systems. Specifications for capital-project design ensure that projects are designed and installed to standards that incorporate reliability considerations.

The Company has also developed long-term plans for the transmission and distribution systems. Reliability improvement is a key objective in those plans. Accordingly, each year's capital projects are configured to provide reliability improvements if possible.

12. The Company keeps itself adequately informed of plans for public construction.

Coping with "interferences" is a major focus of capital-project planning, configuration and prioritization. The Company understands that coordination of its construction programs with those of public authorities is essential to timely and cost-effective completion of its projects. Accordingly, the Company invests significant effort in informing itself about those programs, and in conforming its priorities to those programs.

13. The Company has a sufficient sense of where the gas transmission and distribution systems have capacity available and where new loads might be located.

Gas Transmission Engineering and Gas Distribution Engineering maintain current knowledge of system capacities through their frequent performance of flow studies. System reinforcement projects are part of every capital budget, and are over 10 percent of each year's budget in the three-year capital program approved as part of the GBU's recent rate settlement. While those projects are located where additional capacity is required, the flow studies on which the projects are based provide a more comprehensive assessment of capacity availability on the transmission and distribution systems.

The Engineering groups receive long-term load forecasts each year as part of updating their flow studies. For large loads, the difficulty in siting a large facility anywhere in the Company's service territory means that the Engineering groups have plenty of notice about where any such facility might be located. During the time required for planning and siting approvals for such facilities, the Engineering groups have ample opportunity to suggest alternative sites, or to plan for system reinforcements required to serve the chosen site.

14. The Company has established R&D priorities, and seeks out opportunities to employ cost-effective new technologies.

The top priority for the Company's R&D efforts, both in-house and through industry groups, is the search for construction and testing methods that reduce the need for trenching. Anything that reduces trenching saves time, money and disruption, and is thus a continuing focus of R&D efforts.

CECONY's large inventory of system-improvement projects, both replacement and upgrades, means that the Company is always looking for ways to stretch its capital and O&M budgets. That constant pressure motivates a continuing search for cost-effective new technologies. The Company's responses to Liberty's data requests yielded lengthy lists of technologies that are either currently under development, or have been introduced into field construction and maintenance practices within the last five years.

Impact of New Markets

15. Inputs to the planning process are compatible with planners' needs.

The major gas-system planning activities are:

- Flow studies to: (a) identify reinforcements required to accommodate load growth, and (b) to support planning activities of Electric System Operations and the Steam Business Unit
- Prioritization of gas-mains replacement activity.

The Gas Engineering staffs are well aware of the inputs that they require in order to conduct those activities, and have established processes for obtaining those inputs.

One of the inputs to the planning process is load forecasts. Liberty has some concerns about the Company's load forecasting for the Electric and Gas Business Units, and those concerns are presented in the chapter on Load Forecasting (Chapter VII). Addressing those concerns should not change the ways in which Gas Engineering obtains or uses the forecasts, however.

16. Corporate planning does not advise Gas Engineering of major changes in the business environment that may impact gas-system planning. (Recommendation 2)

As discussed in Chapter III, Conclusion 6, the role of Strategic Planning is not well defined. It can do more to assist the business units by advising them of changes in the business environment. This more global view can set an improved framework for the planning efforts of all business units.

17. Gas-system planners know the types of loads that are anticipated at various locations on the system.

Liberty found that assessment of specific new loads is a strength at CECONY. Responsibilities are clearly established, and systems are in place, to receive essential data on identified new loads, and to track their progress.

18. Gas-system planners know when major new loads might impose costs on the system that would be inconsistent with rate design. (Recommendation 3)

The relationship between cost incidence and rate design is a front-line concern for the gas-system planners' consideration of additional electricity-generation loads. It is a concern for other new loads as well, but planners feel that current Tariff provisions handle most other new loads appropriately.

The NY ISO is conducting a study to determine whether (and how much) new gas-fired generation should be located in the City (and thus be served by the Company's gas systems) in order to provide reliable electric power on an average winter day (average temperature of 20 degrees Fahrenheit). If such generation is required, additional expansion of the gas systems may be required in order to meet applicable design criteria for both electricity generation and natural gas service. If expansion is required, the costs of providing any such expansion should be assigned to the new electricity-generation users.

Plan Integration

19. Gas Operations has a long-term master plan that includes strategies to avoid over-extended lives for equipment and facilities.

Gas Operations has long-term Master Plans for both the transmission and distribution systems. The Master Plans begin with Vision statements, which articulate objectives for the performance of the systems by a specified point in time (2025). Liberty's understanding is that the Master Plans were initiated after the consolidation of the Engineering function, which occurred in 1999, and further refined after segregation of Transmission Engineering in 2005.

Each of the Master Plans contains a list of the improvements to the system that are required to attain the stated objectives. Those improvements include expansion requirements, dealing with aging issues, reliability, and other factors appropriate to a long-term planning horizon. Those lists of improvements have been drawn up and prioritized in ways that avoid over-extended lives for facilities and equipment.

20. Shorter-term changes to the systems are compatible with the longer-term plans.

Each year's Business Plan starts with the Vision statement out of the Master Plans, and specifies how the current year's projects contribute to attainment of that Vision.

21. Guidelines for economic evaluations are in place and uniformly applied.

Design criteria for the gas system provide guidance for economic evaluation of potential projects, including a requirement for cost-effectiveness in project design. Corporate instructions for the capital budgeting process also specify the procedure to be followed for economic evaluations.

22. A structured approach to cost/benefit analysis is in place and uniformly applied.

Most of the GBU's projects are for load relief, reliability or main replacement. There are some, however, that are classified as "cost savings" initiatives. These require special economic evaluation. For those, the Company's Corporate Instruction CI-291-1 prescribes guidelines and responsibilities for cost/benefit analysis.

23. Policies for weighting the benefits of non-financial attributes are in place.

The Master Plans for the transmission and distribution systems include objectives for performance of the systems, such as reliability, that are not directly financial. The design criteria that apply to all system-improvement projects also include specifications that address non-economic considerations.

24. Decision-making processes consider risk.

The most common consideration of risk in Gas Engineering's decision processes is in the gas mains and services replacement programs. Gas Engineering has used whatever data was available to apply risk assessment as a prioritizing consideration for replacement projects.

The introduction of the Mains Replacement Prioritization model is bringing a quantitative dimension to those assessments. The model utilizes a variety of characteristics of each potential replacement project to calculate a Risk Score for each one. That score can then be used to select

that combination of projects that provides the maximum reduction in risk for each year's mains-replacement budget.

Gas Engineering also participates in the Company's Enterprise Risk Management program. That program evaluates risk to the Company from a different perspective, and identifies projects that reduce those risks. Risk evaluation under that program can affect the priority of particular system-improvement projects.

25. Systems for prioritization of gas-system improvement projects are in place and uniformly applied.

As discussed, the annual budget guidance provided by Corporate Budgeting contains priority categories for both capital and operations and maintenance expenditures. Presentation of specific projects for approval is the venue for application of that guidance.

The gas-main replacement program has a single priority, determined through commitment to the NY PSC and the other stakeholders in the Company's rate-case process. Prioritization of projects within that category is guided by leak and leak-repair data, applied through the new Mains Replacement Prioritization program as it is being implemented.

26. Major projects are specified in a way that permits design and installation to be optimally managed.

Facilitating project execution is a priority for both Transmission and Distribution Engineering. Transmission Engineering has a Major Projects group for whom this is a major focus.

27. Mechanisms are in place to provide planners with feedback on field results that should influence future decisions.

Feedback from installation work is the purpose of monthly meetings between Operating Area personnel and the Engineering staffs.

D. Recommendations

Mains and Services Replacement

1. Maintain current information about CECONY's leak-prone pipe. (Conclusion 6)

The Company prepared such a study in 1988, although that study only covered bare steel, excluding bare steel, cast iron and leak-prone plastic. The stated objective of the 1988 study was a cost-effective program designed to "levelize" leak rates. The eight years of experience with main replacement and leak rates, presented in Figure IX.4, suggest broadly that, when the rate of main replacement goes up, the leak rate goes down, but the correlation is not perfect. After the considerable progress in replacing problem pipe over the last 20 years, Liberty recommends that an updated study be prepared, extending to the other categories of leak-prone pipe, as well as bare steel.

The recent Mains Replacement Prioritization (MRP) work is a much more sophisticated way of using leak-repair data to prioritize mains-replacement work within a given level of effort. Liberty suggests that more intensive study of leak-repair and other system-condition data could provide a

better basis for evaluating the progress of the mains-replacement program over a period of years, enabling a more sophisticated basis for programming the work going forward.

In the 20 years since the ZEI Study was done, the gas industry has made considerable progress in understanding the nature of the aging infrastructure problem, and in developing techniques for evaluating the condition of distribution systems. Various types of direct-examination tools now complement leak-repair data as means of assessing risks. This additional knowledge and experience should be brought to bear.

Liberty also recommends that condition data be kept current. The study we recommend should not only develop an assessment of how quickly to proceed next year, but it should also produce an analytical framework for assessing progress and remaining needs and priorities in succeeding years. The study should determine what data should be collected going forward, and how the data should be used in future years.

Liberty presumes that the cost of such a study would be less than \$2 million. Benefits of such a study would come in the form of improved public safety. Liberty declines to speculate on the value of improved public safety, or to prejudge what impact more current information may have on future adjustments to the replacement program.

Impact of New Markets

- 2. Evaluate potential changes in the business environment for each of the businesses; for the GBU, Strategic Planning should advise Gas Engineering regarding potential demands on the gas transmission and distribution systems occasioned by those changes.**
(Conclusion 16)

Gas Engineering is capable of evaluating the consequences for the gas transmission and distribution systems of major influences on those systems. It should not be expected to identify and configure those influences, however. The Strategic Planning unit for the utility businesses should be responsible for identifying major changes in the business environment for those businesses, and for directing particular questions to the system planning units in each business. Additional details of this recommendation are presented in the chapter on Strategic Planning (Chapter III).

- 3. Report to stakeholders and the NYPSC on any expansion of the transmission and distribution systems required to serve winter-period electric power generation.**
(Conclusion 18)

CECONY's gas transmission and distribution systems have been able to accommodate the requirements of both firm customers and electricity-generation users until now, because the two sets of users have required service at different times of the year: firm customers have needed service in the winter, while generation customers have needed service in the summer.

Gas Engineering reports that the NY ISO is currently studying whether additional generation is required in the City in order to maintain electric system reliability in the winter. If additional generation is required, air-quality considerations may dictate use of gas-fired capacity, and

additional gas-fired capacity may require expansion of the Company's gas transmission and distribution systems in order to provide the flow rates and inlet pressures required for operating gas-fired generating equipment.

The Company's Steam Business Unit is also facing equipment retirement issues. The SBU's load also peaks in the winter, at approximately the same time as firm customers for gas service. The most recent additions to the SBU's production capacity have been gas-fired. Additional gas-fired capacity could well add further requirements for expansion of the gas transmission and distribution systems.

Liberty recommends that, in the event that expansion of the gas transmission and/or distribution systems are required in order to serve new electricity-generating facilities, or new steam-production equipment, or both, CECONY should prepare a careful study of what gas system improvements are required to serve those loads, versus capacity additions and "load relief" projects required to serve the Company's firm gas load. The study should be presented to the Company's stakeholders and the PSC as part of its filed materials for its next gas rate case. In conjunction with the Company's approved Tariff, the study should be used to apportion cost responsibility among CECONY's firm customers for natural gas service, new electricity-generation users, and the Company's Steam Business Unit.

X. System Planning - Steam

Steam represents the smallest part of CECONY's business; nevertheless, the system faces many of the same infrastructure and planning issues that challenge electric and gas operations. The steam organizations are well-suited to handle these challenges. CECONY provided Liberty with a number of studies that collectively accomplish its steam planning function. CECONY accomplishes the studies and planning activities by three groups: its engineering staff, its economic feasibility resource planning staff, and its business services and operations planning staff. Liberty found no major deficiencies in the system planning functions; however, a formal master steam plan should be identified as such, incorporating the findings of its various planning studies and findings, providing a road map for the future of its steam business.

There have been numerous reviews of the system and its operations; they have meant repeated tests of the organization and identification of opportunities for improvement. CECONY's responses have been handled positively and with net benefit to the business.

Liberty does believe that a greater amount of attention can be paid to the distribution system in the planning process, which presently seems over-focused on supply. Bringing field realities associated with the distribution system more effectively into the planning process will provide for a stronger plan and more reliable and cost-effective system.

A. Background

This chapter addresses CECONY's planning processes, specifically its long-term plan, business plan, as well as its short-term goals and objectives for the steam system. CECONY's steam planning function coordinates the efforts of its engineering staff, its economic feasibility resource planning staff, and its business services and operations planning staff. The planning function's organization, drivers for system improvement, equipment and component ages, priorities, guidance, cost/benefit evaluations, tradeoffs and decision-making were assessed according to the following measures:

- Is there a long-term master plan in place that offers a credible strategy for how the system will evolve over an extended period, to address system and customer needs, expansion requirements, aging issues, reliability goals, incorporating new technology and other factors important to a long-term planning horizon?
- Is there a system planning staff with the appropriate quantity and quality of skills, to provide economic evaluations of priorities and tradeoffs including how various parameters are used in the decision-making process?
- Is there a strategy in place that describes how the system will avoid over-extended lives for equipment and facilities, including an overall repair versus replace strategy?
- Are there policies for weighting the benefits of non-financial attributes, and a structured approach to cost benefit analysis for handling financial and non-financial benefits?

Liberty's evaluation included consideration of the following key documents:

- Description and nature of the Steam system, Energy function, Risks and Strategy
- Studies of the Steam System that evaluate and define its role in supplying the energy needs of NYC customers, focusing on how best to maintain a reliable cost effective supply of steam to the transmission and distribution system

- *Business Development Plan*: provides an evaluation and basis of forecasts and assessment of customer steam needs on a horizon of 10-20 years
- *Steam Production Cost Study*: evaluates options for producing steam to supply system and customer needs over the next 20 years
- *District Energy Study*: provides an alternative approach apart from the existing steam system, of evaluating the option of supplying steam within a district or discreet area of New York City that may undergo redevelopment
- *Steam Resource Plan*: considers the findings of the business development and production cost studies to propose a 20-year steam resource plan
- *Steam Strategic Plans*: consider business developments and steam resource planning, establishes short term and intermediate goals (1, 3, 5, and 10 years), evaluates the previous year's business developments, analyzes why customers left the system or did not opt for steam service, and addresses the subsequent year's business development and production planning activities
- *Steam Operations Business Plan*: focuses on steam business unit's objectives in supporting corporate goals and initiatives, and how major capital and O&M projects support these
- Specific Short-Term and Long-Term Goals and Objectives: identify those steps needed to be accomplished on short-term horizons and longer-term horizons to meet the Steam Resource Plan.
- Lexington Avenue Steam Incident Action Plan: addresses a series of goals determined by the PSC to improve the safety and reliability of the steam system.

To gain an understanding of System Planning for CECONY's Steam Business Unit, Liberty interviewed representatives from Steam Operations, Central Engineering and the Energy Management Division. Representatives from Steam Operations included the VP of Steam Operations, General Manager of Steam Distribution Operations, Financial Services Manager, Business Services and Operations Planning Manager, and lower level Operations Planning Managers. Steam Operations personnel provided a perspective that included customer, plant, financial, operations and maintenance as well as steam production needs and accomplishments. Engineering provided an understanding of the technical needs and operational constraints of the transmission and distribution piping system. The Energy Management Division provides the short-term and long-term steam load forecasts and cost/benefit analyses of alternative supply options.

CECONY operates the largest district steam system in the United States. The system contains 105 miles of mains and service pipes, with diameters ranging from two inches through thirty-six inches, serving approximately 1,800 customers (1,785 accounts). Commercial and residential customers use steam for heating, hot water, and air conditioning, and avoid the need for smokestacks or individual heating plants. Steam sales account for less than 7 percent of total CECONY revenues. Many buildings cannot switch to alternative fuels. Steam's cost relative to other heating and cooling options is a barrier to further development of the system. The competitive position of steam compared to other energy sources, such as electricity and natural gas, remains a paramount concern. Even so, CECONY continues to focus on retaining existing combined heating and cooling and large heating customers, and seeking to increase penetration into the cooling market. CECONY is committed to maintaining the viability of its steam system

and has implemented strategies to continue to make steam attractive to its Manhattan consumers below 96th Street.

Although the work plan did not specifically define criteria for steam system planning, the criteria for electric system planning were used as a starting point with the recognition that several are not appropriate to steam and that the level of effort applied to steam was considerably less than electric. The criteria by which Liberty evaluated system planning - electric included the following:

- System planning process
 - A long-term master plan should be in place that offers a credible strategy for how the system will evolve over an extended period, including expansion requirements, aging issues, reliability goals, growth of technology and other factors important to a long-term planning horizon.
 - Shorter term changes to the system should be compatible with the longer-term plan.
 - A strategy should be in place that describes how the system will avoid over-extended lives for equipment and facilities, including an overall repair versus replace strategy.
 - Standard planning parameters should be published and updated as appropriate.
 - Guidelines for economic evaluations should be in place and uniformly applied.
 - Policies for weighting the benefits of non-financial attributes should be in place.
 - A system of prioritization of projects should be in place and uniformly applied.
 - CECONY should have a system planning staff with the appropriate quantity and quality of skills.
 - Major projects should be specified by planners in a way that permits their subsequent design and installation to be optimally managed.
 - Standard decision-making rules for design options (overhead versus underground, etc.) should be documented.
 - Planning processes, guidelines and standards should reflect regional differences where appropriate.
 - A structured approach to cost benefit analysis should be in place, with specific instructions for the handling of various financial and non-financial benefits.
 - Decision-making processes should consider risk, preferably in a quantitative way.
 - Mechanisms should be in place to provide planners with feedback on field results that should influence future decisions.
- Technical elements of SP
 - The inputs to the planning process should be credible and in a form and content compatible with the planners' needs.
 - Ratings for equipment loading should be in place; they should reflect the operation expected and should be determined to maximize equipment use while maintaining equipment integrity.
 - Models, both static and dynamic, should be appropriate for the conditions simulated and their limitations understood by those that use them.
- New technologies
 - Suitable investments should be made in defining new technologies that can be integrated into future system design or redesign of the existing system.
 - Optimum use of present technologies and the state-of-the-art should be an appropriate part of the planning process.

- Non-traditional and innovative options should be considered in the planning process.

B. Findings

1. Mission of Steam Operations

CECONY's steam planning function, coordinated among its engineering staff, its economic feasibility resource planning staff, and its business services and operations planning staff, identified that Steam Operations' Mission is to:

- Provide safe, reliable, and economical energy to customers
- Demonstrate respect for the environment and the communities served
- Create an atmosphere that fosters safety and the development of employees
- Provide value to shareholders.

The following areas provide CECONY's basis for operating its steam system, and Steam Operations approach in part, in addressing its safety, reliability and economic responsibilities.

2. Long Range Supply Findings

Many key stakeholders, elected officials, regulators, representatives of large customers, the City of New York, environmental stakeholders and others, recognize the critical importance of the steam system. They recognize steam as an important and essential source of energy for heating and cooling major buildings, many of which cannot switch to alternative fuels. They recognize steam as a critical component in reducing demands on the electric system during peak periods, which benefits all New York electric customers.

Steam Operations stated that steam planning, in addition to ensuring a safe and reliable steam transmission and distribution system, necessarily involves forecasting steam supply needs and production planning. These activities include evaluating the dynamics of customer steam loads and peak loads over a planning horizon of at least 10 years, analyses of which steam plants will be the most economical and reliable supply, and how steam will be delivered to points on the distribution system where it is needed. Some key long-range supply planning findings are:

- Peak winter load is expected to grow from 9.6 million pounds of steam per hour (MMlbs/hr) in 2009/2010 winter to 10.6 MMlbs/hr by 2028/2029 winter
- CECONY needs to replace aging boilers at Hudson Avenue and Ravenswood in the 2013 to 2016 timeframe
- These units will be replaced with either gas fired packaged boilers or a large co-generation facility
- CECONY will continue to operate the East River, 59th, 74th, and 60th Street plants over the next 20 years, with continued environmental improvements and increased use of natural gas.

3. Enterprise Risk Management

As explained in Chapter III, CECONY's Enterprise Risk Management process identifies, and analyzes the most significant operating and administrative risks across the enterprise. Risks are then rated on three-factors for severity, (including sub-factors of safety, financial exposure, and public perception), likelihood and controllability. These are communicated to the steam business

unit as inputs to its steam planning studies. CECONY has identified major risks that may adversely impact safety and reliability of its Steam Operations.

- CECONY needs to continue to develop its enterprise risk management processes in determining steam system risks including whether and how steam safety risks are being addressed and whether and how upcoming emerging environmental issues are being incorporated into the long range planning processes.

4. Operating Parameters

Operating pressure and temperature constraints affect steam dispatch and steam delivery capabilities. Size of steam pipes and distance from steam generation plants act to restrict steam delivery and dispatch. CECONY receives steam in its transmission pipe operating at a pressure of approximately 400 psig, and at a maximum temperature of 475°F. CECONY distributes steam at a maximum pressure of 200 psig (normally in the 150-190 psig range) at 413°F, and a minimum pressure of 125 psig. The steam-piping network supplies customers in Manhattan from the Battery to 96th Street (from the southern tip of Manhattan to 96th Street on the west side and 89th Street on the east side.) CECONY is evaluating how best to improve steam delivery to bolster distribution system pressures on the west side from the 70s streets south.

5. Steam Engineering Distribution Studies

Steam distribution engineering applies models to identify needs and evaluate options that will most effectively and efficiently provide for areas in need of reinforcement and determine impacts from mains taken out of service for repair. CECONY analyzes and evaluates results from its STONER Flow Model for Steam Transmission and Distribution Pressures to ensure adequate system design and capacity to supply steam loads. Engineering also has identified programs to reduce the risks its steam system poses, including replacement of internally pressurized expansion joints, flange replacements, manhole rebuilds, leak repairs and upgrades, and cooling chamber replacements. In addition, CECONY has identified its two most important areas for safety improvement. First, to address some of the root causes of the Lexington Avenue incident, CECONY has begun a three-year program to upgrade the capacities and debris removal from its condensate trap assemblies, and install remote monitoring of water levels in its manhole structures. Second, risks due to internal corrosion have become more urgent because of an increase of leaks on the steam distribution system.

6. Demineralization and Internal Corrosion Leaks

Critical to reducing and preventing internal corrosion of the steam distribution lines is controlling the pH levels of water in steam production. Inappropriate chemical water treatment

processes or demineralization processes for make-up water at steam plants can lead to internal corrosion leaks on the steam distribution system.

The steam distribution system began to experience internal corrosion leaks in 2003. The rate of two internal corrosion leaks per year in 2003 and 2004 spiked to twenty five during 2005. Engineering traced the root cause to the demineralization processes used to purify make-up water for the steam boilers. Demineralization processes use acid and caustic chemicals to regenerate ion exchangers used to control pH and purify water in the boilers. To reduce the risk from using acids and caustics, CECONY began using water-softening processes. In hindsight, this proved to have had an adverse effect on controlling pH of the water.

CECONY converted from demineralization to water softening in 1999. This conversion was possible due to reducing the pressures of boilers from high-pressure to low pressure at the 59th Street, 74th Street, and Hudson Avenue plants. Lower pressure boilers (packaged boilers) allowed the use of a brine solution to soften the water to remove calcium and magnesium from the makeup water to the boilers. As a result, internal corrosion leaks at the 6 o'clock position began to occur on the steam distribution system at locations where the steam condensate on the distribution system could pool.

In 2006 to address this issue, CECONY installed temporary demineralization at its 59th Street plant, and reduced steam dispatch from its 74th Street plant. As permanent solutions, CECONY during the 3rd quarter of 2009 will install demineralization at its 74th Street plant and in the 3rd quarter of 2010 will install demineralization at its 59th Street plant.

7. Steam Supply

CECONY steam resource and load forecasting studies determined steam generation capacity (supply) available during both peak winter and summer loads appears sufficient. However, the repowering of the East River power plant due to the Waterside power plant sale, originally estimated at \$350 million, actually cost \$700 million. The cost of repowering and installing package boilers has resulted in upward pressure on steam costs.

Steam would be close to being capacity constrained during the peak winter period, considering a peak period generating capacity of 12.3 MMBtu/hr, resulting in only 0.4MMBtu/hr of additional marketable winter capacity. However, CECONY's current analysis indicates its peak period generating capacity is more than 13 MMBtu/hr (including BNY). This results in a peak-period margin of approximately 30 percent. CECONY maintains an installed reserve margin of at least 1.6MMBtu/hr, equivalent to the largest single production unit, in accordance with company planning criteria. CECONY believes additional operating reliability is provided by holding units with quick ramping rates at operating levels that allow for system recovery in the event of loss of the largest unit. The operating and planning criteria are established to prevent system pressures from decaying below 125 psig. The summer maximum steam generating capacity is less, approximately 11 million pounds per hour due to units being unavailable and to the devotion of more generation to electric load. Recent actual winter sendout on a 13-degree day was 8.3 million lbs/hour.

[illegible]

Steam Resource Planning (Energy Management Division) provides an economic perspective evaluating long-term least cost planning of major steam production projects and reliability

planning tools. This area is also responsible for long-term peak load forecasting. The Section Manager (who reports to the Director of Resource Planning) has 1½ years of resource planning experience with CECONY, and previously worked with NRG, Sithe, Iroquois Gas Transmission System, and New York Power Authority, in planning and operations. Four people (three engineers and one accountant) directly support the Section Manager Steam Resource Planning. The Director of Resource Planning, has three sections:

- Load forecasting
- Electric resource planning
- Steam resource planning -- long-term least cost planning which involves:
 - Economic analysis of major steam production projects (in the power plants)
 - Application of reliability planning tools.

Steam Resource Planning utilizes the PROMOD, MAPS (multi area production simulation) tools for economic optimal use of steam production for a given amount of peak load. These are the tools used for this purpose in the industry. Parameters used in the above tools include variable production costs of all units for economic dispatch of the system, cost variables are fuel, Operation and Maintenance and unit heat rates (fuel converted into steam production).

Steam Business Services and Operations Planning (Steam Operations Business Unit) provides a business perspective of sales forecasts, goals and planning. This information includes weighting the benefits of non-financial attributes, and a structured approach to cost benefit analysis for handling financial and non-financial benefits. The Department Manager, Steam Business Services and Operations Planning (who reports to the Vice-President of Steam Operations) has degrees in BME, MBA, 25 years with Con Ed and 13 years with other utilities, including 3 years experience with Con Ed steam business services and operations planning. The Manager, Steam Business Services and Operations Planning, has twenty-six people reporting to him, nine in business development, six in operations planning, six in customer operations, in addition to communications and project specialists.

Central Engineering provides an engineering perspective of the needs of steam generation, and steam transmission and distribution system design. The Chief Engineer, Civil/Mechanical – Central Engineering, reports to the Vice-President of Central Engineering, and has degrees in BME, MBA, and 35 years experience in CECONY engineering, construction and operations, including 15 years of steam experience. The Chief Engineer has seventy engineers reporting to him, and is supported by \$7 million of outside contract support that work with steam plant engineers to evaluate and study system components, operating and maintenance trends, production forced outage rates, loss of service, and system component useful lives. Such studies work to avoid over-extended lives for equipment and facilities, and address repair versus replace strategies. Central engineering has five sections:

- Two mechanical engineering sections, both support power plants, one of which supports steam distribution engineering
- Two civil engineering sections, one of which support steam generating stations, and one of which supports electric substations
- One steam distribution engineering section.

Central Engineering evaluates improvements to the steam distribution system to meet operational needs as supply and loads change.

This steam planning function, in addition to ensuring a safe and reliable steam transmission and distribution system, necessarily involves steam supply and production planning. This role includes a perspective of customer steam loads and peak loads over a planning horizon of at least 10 years, analyses of which steam plants will be the most economical and reliable supply, and how steam will be delivered to points on the distribution system where it is needed. These three groups evaluate and study the steam system, and produce steam plans addressing safety, reliability and economic issues.

9. Studies of the Steam System Supporting the Planning Function

a. Steam Business Development Plan – August, 2005

As required in the 2004 Steam rate case, CECONY developed its Steam Business Development Plan, which has a 10 to 20 year perspective. Highlights from the report's executive summary follow.

The objectives were to address a minimum of 5 issues as follows:

- Identify market sectors and geographic areas suitable for expansion of steam service, identify market risks and obstacles impeding the growth of steam sales, and recommend the means to overcome them
- Investigate with applicable equipment vendors possible means of reducing the financing cost and other financial arrangements for purchasing and leasing steam equipment
- Explore the use of business incentives, including negotiated rates, to promote load growth
- Set sales growth targets and hold educational workshops and meetings for contractors, building owners and managers, architects, engineers, and equipment manufacturers to increase knowledge of steam benefits
- Develop mechanisms for monitoring steam business development.

The Business Development Plan findings and recommendations included:

- Steam's cost relative to other heating and cooling options is a barrier to further development of the steam system.
 - o Differential taxation between natural gas and steam results in higher steam prices
 - o Improvements in building scale boilers allow customers to install their own central heating plant and produce steam on site, cheaper than they can buy it from CECONY
 - o Steam-only cooling is not cost competitive
- Steam for heating loads wins 80-90 percent of new large commercial customer loads.
 - o Customer cogeneration and boilers are a threat to CECONY's steam advantage
- CECONY needs to focus on retaining existing combined heating and cooling and large heating customers, and increase penetration into the cooling market
 - o Steam was close to being capacity constrained during the peak winter period; when its peak period generating capacity was 12.3 MMBtu/hr providing a peak-period margin of 18 percent; CECONY maintains a 1.6MMBtu/hr reserve margin sufficient to deal with both low-pressure avoidance and loss of the largest steam generator; this left only .4MMBtu/hr of additional marketable winter capacity. (Note that

CECONY's current analysis indicates its peak period generating capacity is more than 13 MMlbs/hr, providing a peak period margin of approximately 30 percent. Therefore, the steam system is no longer capacity constrained.)

- o Increased production from central cogeneration may enhance the net cost of steam
- Government programs are not coordinated, sometimes conflict and do not reflect the value and potential effects steam chillers and cooling can have on reducing peak summer electric demand (electric peak load displacement)
- Expansion into the Hudson Yards area is challenging and is not justified based on the current cost of system extension
 - o \$2,000 per foot of 12 inch pipe
 - o \$4,000 per foot for 20 inch pipe
- CECONY should consider models such as combined heat and power or campus style steam chilling and heating systems to enable the company to grow outside the constraints of the existing steam system and the current line extension policy.

b. Steam Production Options Study – October 2006

In September of 2004, the NYPSC issued an order adopting a proposal that called for CECONY to work with the Steam Business Development Task Force to develop the scope of a steam production cost study of long-term (20-year perspective) steam production options. An independent engineering firm, WorleyParsons Group, Inc performed the Phase 1 study of plant capacity, construction and installation requirements, plant performance, and other factors to assess their impact on the cost of steam production. Highlights from the report's executive summary follow.

The objectives of the Phase 1 study were to:

- Assess the condition and operation of four CECONY facilities
 - o Hudson Avenue Station (Brooklyn)
 - o 74th Street Station
 - o 59th Street Station
 - o Steam Generating Station
- Estimate the cost of steam production at the four facilities over the next 20 years
- Identify (analyze technical and economic criteria) repowering options for reducing cost of steam production
- Obtain information from potential merchant steam suppliers [Owner(s) of Ravenswood LLC Unit 40 cogeneration plant, TransGas Energy's proposed combined cycle plant, and the Brooklyn Navy Yard Cogeneration Partners (BNYCP)] regarding steam supply capability, price, or additional steam in the case of BNYCP
- Estimate cost to produce steam for the CECONY steam system (one with a boiler and one with a cogen system)
- Estimate impact of repowering options and steam supply by the alternative facilities on steam production costs and emissions City-wide.

Results of the Phase 1 study findings and recommendations included:

- Boilers at the 59th and 74th street stations will provide reliable operation for the next 20 years with current ongoing and planned upgrades and maintenance programs

- The riveted old pressure boilers and auxiliaries at Hudson Avenue Station are not suitable for the next 20 years without replacement. The boiler house buildings and structures are not suitable for new equipment
- The boilers at Ravenswood Steam Generating Station (one shutdown since 2001, and 3 remaining boilers operating 20-30 percent below design capacities), need rebuilding or replacement to provide reliable service over the next 20 years
- At Hudson Avenue Station, after analyzing fourteen options, conduct further study of three options having the lowest Unit Net Present Value (NPV). The two lowest cost options were
 - Refurbish the currently retired Unit 10/100 boiler with a topping steam turbine at the facility, conversion of the boiler to natural gas firing as the primary fuel, retrofitting the system with a dump condenser to increase annual electric energy generation, and add new packaged boilers to meet the facility steam capacity criterion; this option has the lowest Unit Net Present Value (NPV) of steam production of all options at the facility
 - Install new packaged natural gas-fired (primary fuel) boilers; this option has the next lowest Unit NPV of cost of steam production (within 7 percent).
- At Ravenswood, replace all four existing boilers with new packaged boilers with the same generating capacity (13 percent lower than the 100 percent Electric Ravenswood generating and steam production station option)
 - Alternatively consider the Steam and Electric supply option as an alternative to Ravenswood steam generating station repowering
- The Customer Supplied Steam Options are not economically competitive with CECONY steam production facilities.

c. Energy Infrastructure Master Plan December 2005

To coordinate NYC long range planning (20 year time perspective), for economic development, CECONY committed in its steam rate case (03-S-1672) to develop Energy Infrastructure Master Plans for redevelopment areas. It did so for the redevelopment areas of Hudson Yards through 2025 and for lower Manhattan through 2015.

d. District Energy Study – June 2007

For Hudson Yards, CECONY evaluated the technical and economic feasibility of building a district energy system to provide heating and cooling services to individual buildings within the Hudson Yards. This report follows up on recommendations made in the Business Development Plan of August 2005.

e. 2007 Steam Resource Plan – October 2007

The Steam Resource Plan filed with the Commission on October 26, 2007, describes CECONY's steam production plans for the next 20 years. The long-term steam resource planning process is essentially a three-step process.

- Steam peak load forecasting
- Capacity, load and resource requirement evaluation
- Determination of the required reserve.

This plan's recommendations follow the 2005 Steam Business Development Plan recommendations, the 2006 Steam Production Cost Study Phase 1 study of production options, and further includes detailed investment grade cost estimates (IGCS) for the two Hudson Avenue replacement options (conducted by Parsons Brinkerhoff filed in August 2007).

The plan's principal findings and recommendations are:

- Winter peak load will grow from 10.5 MMBtu/hr in 2008 to 10.9 MMBtu/hr by 2027
- CECONY will replace boilers at the Hudson Avenue Station with new package boilers in a new building (1.6 MMBtu/hr) by 2014
- CECONY will replace the boilers at the Ravenswood Steam Station (by installing two to four new boilers, each capable of .244 MMBtu/hr) by 2017
- Replacement capacity up to 1.6 MMBtu/hr will be required at the Hudson Avenue Station.
- Depending on the pace of customer needs, replacement capacity ranging from 0.488 to 0.976 MMBtu/hr is needed from the Ravenswood Steam Station
- All existing plants are needed to reliably serve expected loads. CECONY will continue to operate the East River, 59th Street, 74th Street, and 60th Street steam generating stations over the 20-year planning period consistent with the Steam Production Options Study Phase 1 Final Report of October 2006.

CECONY updated the Steam Resource Plan with a December 31, 2008 supplement, as required in the most recent Steam Rate Plan.

e. Steam Strategic Plans dated January 2007 and January 2008

CECONY develops annual Strategic Plans of its steam system. These are annual reports of steam business development and steam resource planning, prepared and updated annually, and were required by the two-year steam rate plan Commission Order dated September 22, 2006. The strategic plans are required to address the following:

- Findings of the Steam Business Development Plan, the Steam Production Cost Study, the Steam Resource Plan in a manner designed to maintain steam system viability
- Establish one, three, five and ten year goals for business development and production
- Discuss prior year's and subsequent year's business development and production planning activities
- Analyze why certain customers left the system and the steps taken to address the issues, as well as reasons why buildings larger than 250,000 square feet may not have taken steam service the past year.

f. Steam Operations Business Plan for 2009

CECONY outlined its Steam Operations Business Plan for 2009, and emphasized that unlike planning just 5 years before, current plans are actually useful and steam operations uses the business plan to help focus department objectives in supporting corporate goals as follows:

- Steam Department Objectives mesh with Corporate objectives and initiatives
- Major capital and O&M projects meet those initiatives
- Key performance measures address departmental objectives, which support company objectives

- Long range issues for the department foster expansion of steam cooling for existing steam heating customers (also takes pressure off electric peak demand).

Objectives focus on:

- Expenditures for O&M and for capital projects conform to Steam and Electric Rate Settlement Agreements
- Maintaining favorable operating income and Return on Equity
- Improving system reliability and environment Health and Safety performance
- Developing employees skills
- Expanding business development.

g. CECONY's 2008 Accomplishments

- In explaining how its 2008 activities address system needs, CECONY identified actions its Steam Incident Action Plan is addressing (in response to the steam pipe rupture at 41st Street and Lexington Ave). These actions are described separately below.
 - 2-year rate plan (Oct 2008 to September 2010) settlement reached
 - o Base rate increases of \$53 million in RY1, and \$24.7 Million in RY2
 - o 9.3 percent ROE
 - o Potential penalties of \$1 million geared toward safety, business development, and customer satisfaction
 - o CECONY will supplement its Steam Resource Plan with a study of a Co-Generation option for up to 500 MW at Hudson Avenue
 - o Major Key Performance Indicators are generally moving in the positive direction
 - o Production forced outage rate in 2008 is 1.9 percent compared with 4.0 percent goal
 - o Steam system pressures within normal range 99.99 percent of the time compared with goal of 99.7 percent
 - o OSHA incident rate is 3.10 compared with goal of 3.31
 - o Opacity occurrences are 48 compared with yearly goal of 227
 - o Steam leak backlog is at 25, above a goal of 22
 - o Stack days are 912, above its goal of 900
 - o Steam distribution "Quality Index" is 213.4 versus a goal of 250; the quality index represents the number of defects on the steam distribution system; it consists of two categories: Quality of life (field operations) and Quality of Customer Service (steam distribution services).

10. Steam Incident Action Plan

Following the 2007, 41st Street and Lexington Avenue steam failure, CECONY implemented a Steam Incident Action Plan. The causes of the incident included repeated attempts at repairs to a flange fitting located at a deep location within a manhole by applying flange sealant materials. Debris from the sealant repairs partially or fully blocked a steam trap. Following a rainstorm, vapor patrols did not detect the changes in steam vapors at the location. Eventually water hammer within the steam lines resulted in catastrophic failure.

The major components of this plan included:

- Developed and implemented a rain response procedure for direct physical inspection and pumping at critical locations due to flooding
- Developed and implemented a procedure to evaluate manhole information to identify locations that require automatic pumping
- Conducted an engineering evaluation of facilities similar to 41st and Lexington (deep offset locations to eliminate similarly located flanges and deep offset conditions)
- Developed and implemented enhanced procedures and inspection and replacement programs to ensure that traps are clear of debris
- Installed and tested remote monitoring equipment for water infiltration in manholes and for trap monitoring
- Investigated the use of high capacity traps and modified the trap assembly design to improve debris removal
- Developed and implemented a failure analysis procedure to better identify trends and implement corrective actions for failed components
- Developed and implemented a procedure to review Steam Operations Mapping Information System (SOMIS) to prioritize work
- Developed procedure for SOMIS to control tracking of projects, with additional approval for closing out jobs
- Developed and implemented an improved manhole inspection procedure to include documentation of additional items and engineering evaluation for critical deficiencies, and timeframe to correct deficiencies
- Established a procedure for contractor oversight (contractors were used for repairs to leaking flanges)
- Discontinued the use of leak sealant unless CECONY is able to demonstrate proper controls and ensure components are not adversely impacted
- Revised welding repairs procedure to classify repairs as temporary versus permanent.

11. Advanced Technologies

CECONY is working on an R&D project to determine whether partially blocked traps may exist at a location. They plan to install thermocouples at the trap to enable them to determine if a trap is partially blocked. This project may eventually allow them to eliminate the 6 month visual inspection of traps.

Currently CECONY steam traps have a 2,000 lbs/hr capability. They are evaluating the practicality of 8,000 lbs/hr capacity traps to function even when partially blocked. The capacity limits depend on ability to dispose of that amount of condensate.

The company is also replacing shuntflo meters in steam customer facilities with vortex meters to improve accuracy at low flows as well as reliability.

The company is evaluating pilot programs using thermocouples to enable trap manholes and other vapor structures on the steam distribution system to be remotely monitored from its East 16th Street facility in Manhattan. The intent is to determine trap failures, identify those manholes with high water levels (causing condensate formation within steam pipes), and identify pump failures or water infiltration into structures. Currently, CECONY has installed 100 remote

monitoring of water vapor condition locations. CECONY is evaluating how best to remotely monitor all 837 steam trap locations.

12. Capital Projects – 5-year Budget

For shorter horizon timeframes, CECONY accomplishes its planning by means of the annual and five-year budget processes for Capital and O&M projects. O&M budgets have annual and two-year O&M budgets as well as 5-year budgets. Capital budgeting is developed on a continuing 5-year period. CECONY applies a capital project prioritization matrix approach in developing its capital budgets and in establishing priorities. At the beginning of each budget process, each operating area, plant manager, section manager, meets with the vice-president of steam to determine categories of project needs and justifications. Points are assigned for various factors. Central engineering also evaluates projects using the prioritization matrix approach. Steam Operations applies a simpler prioritization approach to evaluate projects within its O&M budget. Major 5-year projects include:

- Burner Management System and Distributed Control System upgrades
- De-mineralization installations at plants, 74th and 59th Street Stations
- Continuous pH and temperature monitoring systems
- Oil/water separator upgrades
- Trench cleaning and upgrade program
- Fish life preservation
- Advanced metering
- Remote monitoring.

C. Conclusions

1. CECONY's steam planning function is coordinated with input from three departments: Steam Operations, Central Engineering, and Energy Management.

The staffs within the three departments supporting and addressing the planning function described above contain the appropriate quantity and quality of skills, and provide economic evaluations of priorities and tradeoffs including how various parameters are used in the decision-making process. System Engineers at Plants and Central Engineering engineers conduct condition based assessments, which lead to engineering based requests, boiler assessments, and accelerated corrosion studies. For planning purposes and to ensure adequate system design and operation, CECONY analyzes and evaluates results from its STONER Pressure and Flow Simulation Model for Steam Transmission and Distribution Pressures. The Steam Operations Planning group runs the PROMOD model to forecast steam sendout. PROMOD results are shared with Steam Resource Planning for evaluation of long-term options. Resource Planning runs the MAPS (multi-area production simulation), model, which is used to forecast electric production, including Con Edison's electric generation. Both of these tools are important parts of the steam resource planning process, though these tools have other important applications beyond steam planning. The engineering staffs working with contract support and plant personnel evaluate and study system components, operating and maintenance trends, production forced outage rates, loss of service, and system component useful lives. Such studies work to avoid over-extended lives for equipment and facilities, and address repair versus replace strategies.

2. CECONY's steam system has been effectively studied in response to Orders from the NYPSC and as a requirement related to rate case proceedings.

The mandated studies have developed CECONY's understanding of:

- Steam markets, impediments to expanding steam sales and cost competitiveness
- Steam plant's condition and operation, cost of steam for the next 20 years, and evaluation of repowering options
- Consideration of steam customer needs, growth, and steam production options
- Identification of next steps to maintain a viable steam system, and establish one-year, three-year, five-year, and ten-year goals to address business development, production planning, and why larger customers may leave or not take steam from the steam system.

3. The mandated studies of the steam system have contributed to development of the 2007 Steam Resource Plan; the Plan is the closest CECONY comes to having a long-term steam master plan.

CECONY has carried out a number of studies required of it; they provide the basis for its long-term plan and business plan. These are updated periodically, particularly its operations and business plans and steam system resource plans. The plans identify how the steam system loads will evolve over an extended period and offer options as to how the steam system may continue to be a viable energy option for its customers. Steam plans and business plans adequately address steam supply and customer needs. The studies examine resource priorities, provide guidance and evaluate tradeoffs in making their recommendations incorporating new technology and other factors important to a long-term planning horizon.

4. CECONY has not formally identified a master plan for its steam business unit. If the steam resource plan is to be considered a comprehensive master plan, it lacks sufficient focus on proactively addressing safety issues as well as potential upcoming environmental mandates and an expanded focus and input regarding the needs of the steam transmission and distribution system. (Recommendation 1)

The company's planning process should incorporate a greater emphasis on what is happening on and to its distribution system. Root causes resulting in incidents should not come as a surprise, but input from field personnel needs to routinely be given greater weight and become part of the planning process to prevent incidents.

The steam resource plan focuses more on steam supply and economic cost and benefits. A Steam Master Plan must also include sufficient evaluation of the transmission and distribution system, how the system will evolve over an extended period, address system needs, expansion requirements, aging issues, reliability goals, as well as proactively addressing safety issues and potential upcoming environmental mandates.

CECONY's long-term plans do not adequately have an operations perspective. Plans justifiably need to provide a focus on those steam system components that have a large impact on cost of service. CECONY's long-term plans have identified these drivers, and studied supply needs and alternatives especially those involving strategic alternatives such as which steam generating plants have aging components in need of replacement. The company has further identified the need for considering alternatives such as replacing boilers with steam only package boilers

versus co-generation, and the concept of providing steam via a district energy system. However, because of this emphasis, the company appears to give operations issues less attention. This seems to result in more of a reaction mode as incidents occur.

For example, the Grammercy Park incident in 1989, the Lexington Avenue incident in 2007, and the branding incident involving steam manhole covers, or even the deterioration of pipe components and structures such as flanges, in tunnels and manholes. Even when identified, operational issues may require an extended period to address despite diligent efforts. For example, in 2006, an outside consultant and experts from MIT performed extensive testing and verification to confirm the root cause of the corrosion leaks. Also in 2006, design work required to support the installation of a temporary demineralization plant at the 59th Street Station was completed, allowing installation that same year. Operational changes were implemented, which minimized steam supply from 74th Street Station when possible. Detailed design work began in 2007 supporting the installation of new demineralizers at 74th Street Station. Physical work began in 2008 and is scheduled to be completed in 2009. Detailed design work began in 2008 supporting the installation of new demineralizers at 59th Street Station. Physical work is scheduled to begin in 2009 and is scheduled to be completed in 2010..

5. CECONY appears to be effectively following up on the results of the steam studies. Planning objectives and steam study recommendations are being addressed by the steam operating groups.

Liberty observed evidence of follow-up in steam business development goals. CECONY is meeting its new load goals and working on retaining its existing customer base. Due to the economic downturn, 30-40 commercial projects to increase steam load are in progress even though several projects were postponed. CECONY is evaluating actual new customers, as well as its prior 5-year loss of customers in order to identify and address its customer needs, improve its steam sales and marketing, and more accurately predict 5-year load forecasts. CECONY anticipates 24 new or returning accounts will be connected to the steam system contributing pure base revenue of \$2.6 million.

Liberty saw further evidence that CECONY is acting on the results of the various steam studies in company follow-up actions to replace the aging boilers at Hudson Avenue and Ravenswood in the 2013 to 2016 timeframe. These units will be replaced with either gas fired packaged boilers or a large co-generation facility and further studies are continuing to determine the best types of steam plants considering all aspects identified by the previous studies.

D. Recommendations

1. Identify a Steam Master Plan and incorporate within it a greater emphasis on what is happening on and to its distribution system. (Conclusion 4)

As part of a master plan, CECONY needs to actively ensure it has processes that specifically identify and proactively address the risks including safety issues and problems affecting its steam system. The processes need to identify and address potential environmental mandates. CECONY's enterprise risk management processes need to continue their development in identifying risks to the steam business unit so they may have adequate weight in the long term planning process.

Root causes resulting in incidents should not come as a surprise, but input from field personnel needs to routinely be given greater weight and become part of the planning process to prevent incidents. Due to appropriate supply reliability and customer business concerns, as well as the large costs and lead times associated with plant construction or reconstruction, the steam resource plan focuses more on steam supply and economic cost and benefits. That is understandable. However, a Steam Master Plan must also include sufficient evaluation of the transmission and distribution system, how the system will evolve over an extended period, address system needs, expansion requirements, aging issues, and reliability goals.

The company's planning process should incorporate a greater emphasis on what is happening on and to its distribution system. Input from field personnel needs to routinely be given greater weight and become part of the master planning process to accomplish all three legs included within the Steam Mission statement, to provide safe, reliable, and economical energy to our customers.

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XI. Budgeting

Budgeting is a central corporate process that establishes all spending plans and CECONY Board of Trustees authorizations for the next calendar year. CECONY's capital expenditure and operating expense budgets have increased significantly in the past few years, resulting in the need for annual electric rate increases for the 2008 and 2009 rate years and beyond.

The company has most of the appropriate systems and processes in place to effect the development of annual budgets that combine the identification of system requirements from the bottom up. The company also has used top-down expenditure targeting in past years to provide spending caps and resulting financial discipline for the budgeting process.

The budgeting process has been stressed by CECONY's need for much higher spending levels, especially in the electric business, during the past few years. With increasing levels of electric expenditures, the rigor of the budgeting process has been compromised by leading and overriding rate case requests. The budgeting process is also not designed to provide direct linkage to and defined progress toward meeting a long-term electric system vision and "master plan". The company also does not use long-term economic methods to justify projects and allow the consistent allocation of limited funds between organizations and projects. Improved analysis also can provide better decision-making information that may be used by the board and shared with the commission and other stakeholders.

A. Background

The development of CECONY's annual budget involves essentially all of the company's management. The budget establishes all capital and operating expense spending that is planned for the budget year. The process starts with the targeting of financial goals and objectives. It includes the building of the budget from the bottom up by field managers and engineers. The process provides for the identification, analysis, and justification of projects and expenditures by each functional organization. After the development of budget proposals, middle management reviews, adjusts, and eventually approves a proposed budget for each major organization. Review and approval processes continue at executive management levels of the company, including any allocation or reallocation of spending among the various organizations. The budget is then presented to the CECONY board for approval.

Liberty has reviewed and evaluated the CECONY budgeting process from its initiation to completion, focusing primarily on the 2008 budget year (the most recent at the initiation of the audit). Liberty's evaluation has focused on four broad categories. Those categories and the evaluation criteria that govern each are as follows:

- Budget targets and planning
 - Executive management and budget-responsible managers should use common values, goals and objectives from system reliability and financial performance standpoints.
 - Management's top-down budget guidance must be consistent with meeting the expectations of the Commission and good utility practice.
 - Management budget targets or "caps" based on financial result expectations must be flexible enough to allow required system expenditures to ensure reliability.

- Current rate levels should not be used as a "hard cap" in setting top-down budget targets.
- The budget should be prepared using a consistent set of budget guidelines, schedules, assumptions, forms and processes to ensure smooth operation and consolidation.
- Managers with budget responsibility must have the resources required and clearly defined roles, work product and scheduling requirements.
- The budget process should be managed and coordinated by a manager with appropriate responsibility and accountability for the process.
- The bottom-up budget development process should involve all of the organizations whose operations require capital expenditures or significant operating expenses.
- The capital and O&M budgets should be driven primarily by a bottom-up examination of system needs that is not unduly restricted by financial targets or caps.
- Budget process and prioritization
 - Projects should be initiated from the field or engineering level with a consistent justification form.
 - Projects or expenditure programs should use consistent and sound methods for estimating program costs.
 - Expenditure items should be analyzed using consistent engineering methods so that their effect on reliability may be compared between projects or programs.
 - Expenditures should be analyzed using a consistent financial analysis method or model that analyzes economic benefit over its life cycle, including cost/benefit and payback measures.
 - Capital expenditures and operating programs should be priority ranked by their impact on system operations and reliability.
 - Capital expenditures and operating programs should be priority ranked by their economic impact, or cost/benefit where possible.
 - Repair/replace options should be analyzed using consistent life cycle analysis methods.
 - Capital expenditures and operating programs should be prioritized at each level of bottom-up development in accordance with appropriate reliability or economic measures.
 - Expenditures that are believed to be required for system operation and reliability should not be excluded in the bottom-up budget development due to top-down budget targets.
 - A process should be in place to include required expenditures in the budget above "cut-off levels" that are required for sound system operation and reliability.
 - The budgeting process should make adequate provisions for disclosing the costs of multi-year projects approved in earlier years and for addressing carry-overs or shortages of funds budgeted.
- Budget impacts and approvals
 - CECONY executive management should take reasonable efforts to balance the resource allocations of the electric, gas and steam businesses in the budgeting process.
 - Budgets should be approved by the SR VP of each functional area with prioritized expenditure lists.

- Executive-level budgets should be easily coordinated and consolidated at the corporate level due to the use of consistent budgeting formats, information and schedules.
- Approved budget information should be consistent with that incorporated into revenue requirements analyses and rate case filings.
- CECONY should analyze the revenue increase or decrease required to earn its allowed ROE with the approved expenditures for the budget year and as forecasted for the following two years.
- CECONY should not use current rate levels to act as a cap on budgeted expenditures.
- CECONY should determine the amounts of external financing that will be required during the budget year and for the two following years.
- The utility should analyze the types of financing and the preferred timing to meet the cash flow needs of the budget, maintain the targeted capital structure, and to gauge market acceptance and possible alternatives.
- Senior parent executive management should take reasonable efforts to assure that CECONY needs receive sufficient priority as overall spending priorities are set and budgets are consolidated at the parent level.
- Management reporting
 - Budget performance should be reported monthly in clear reports that identify performance and responsibility at the reasonably low organizational levels.
 - Management reports should provide clear performance information that conforms to budget categories and details for process consistency.
 - Management reports should have the capability and flexibility to effectively handle projects that have expenditures in more than one budget year.
 - Budget variances should be clearly identified, evaluated, and corrective action taken in a timely fashion.
 - Budget variance remediation actions should not cause projects or programs required to maintain system performance to be postponed or cancelled.
 - Audited feedback loops should be in place to evaluate the quality of project analysis and cost estimate information to constantly improve decision information.
 - Periodic, structured examinations of the effectiveness of past prioritization efforts (projects that did and did not make the cut) should be performed to improve decision making.

B. Findings

1. Budget Targets and Planning

The company describes its budget process as follows: “To implement its strategy objectives, the company develops a forecast of its needs, identifies projects to meet those needs and develops work plans. The company employs a streamlined budget process to develop its capital investment and annual operating expense needs.” The company seeks to use the budget to link its business priorities in a work plan, in order to achieve its strategic objectives. These objectives are to:

- Provide reliable service at reasonable costs
- Be responsible stewards of the environment

- Enhance external relationships
- Strengthen the company's support activities
- Strengthen the company's human resources.

The company also represents that it incorporates the following key drivers into budget development to determine the appropriate level of capital and operating expenditures:

- Meeting strategic objectives
- Meeting stakeholder expectations
- Meeting anticipated growth needs
- Maintaining and enhancing reliability.

However, on a practical basis, the company begins its budget process by setting top-down budget targets that provide managers with allowed spending levels for the development of projects, programs and expenditures. CECONY's targeting of budget levels from the top down applies the allowed return on equity for each of the electric, gas and steam businesses. These returns have been reset to lower levels in recent rate cases, from 9.7 percent to 9.1 percent. Recognizing the lower return platform of 9.1 percent, the company also has a financial strategic objective of growing its earnings per share by three to five percent per year in the future. Target budget-expenditure levels for CECONY would earn the public service commission-allowed return on equity for the three utility businesses while maintaining longer-term earnings per share growth. The return thresholds and growth targets thus serve as the two governing financial goals.

The CECONY Controller's organization uses the corporate financial forecasting model to determine the capital and operating expense levels that meet financial targets. This group first prepares, in June of each year, preliminary one-year and five-year forecasts, which include rates currently in effect and any rate increases that may be currently under review by the public service commission. This section addresses later the central role that rate-change filings play in determining budget levels. The early phases of the process use expenses and capital expenditures from the previous year's forecast. The return on equity of the forecasts is compared to the public service commission-allowed ROE for the electric, gas, and steam utility businesses. The Controller's organization then reviews and analyzes the short- and long-term earnings per share produced by the forecast. The group also reviews external financing required to fund utility operations.

The next step involves the preparation of a budget target impact forecast. This forecast includes the capital expenditures and operating expense levels that will cause the company roughly to meet the return on equity and earnings per share targets from a top-down perspective. The Controller's group reports the first-year's expenditure levels to the CFO and CEO. These expenditure levels become the total company budget targets, which company managers then receive in an official "budget guidelines" memorandum prior to the commencement of the annual budget process. Managers then build their capital and operating expense budgets from the bottom-up in each organization. Five-year forecasts are also prepared as part of the modeling process, based on revenue forecasts, the five-year capital expenditure forecast, and operating expense forecasts.

In early July of each year, the budget guidelines memorandum from the Vice President & Controller goes to all budget-responsible managers. The budget guidelines set a cap for total capital and total operating expenditures. The budget guidelines also include schedules for completing the steps in setting capital and operating expenses. The guidelines include common planning assumptions; *e.g.*, wage escalation and productivity changes.

The guidelines include targets for capital expenditures and operating expenses for each of CECONY, finance, public affairs, legal, and shared services. Within the utility sector, the COO provides a rough allocation of the capital and O&M expenditure “pots” among the three businesses with input from the Planning and Analysis group and using historical spending patterns as a primary allocation basis. The following table presents the CECONY capital budget guidelines for the 2008 budget year.

CECONY 2008 Capital Budget Guideline

Item	2008*	Rate Case Programs	Budget Guideline
<i>Electric</i>			
Production	\$ 33	\$ 3	\$ 36
Transmission & Switching Stations	165	106	271
Substations	441	110	551
Distribution			
New Business	117	27	144
Burnouts	197	(99)	98
Interferences	25	-	25
Improvements/ reinforcements	272	288	560
Telecom	2	-	2
Transformers	94	50	144
Meters	12	-	12
Total Distribution	\$719	\$266	\$985
Total Electric	\$1,358	\$ 485	\$1,843
<i>Natural Gas</i>			
Total Natural Gas	\$ 257	\$ 42	\$ 299
<i>Steam</i>			
Production	49	-	49
Distribution	22	-	22
Total Steam	\$ 71		\$ 71
Common	\$193	\$117	\$310
Lower Manhattan Restoration	\$ 32	-	\$ 32
Total Capital Expenditures	\$1,911	\$ 644	\$2,555

Millions of dollars

* from 2007 5-year Forecast

The following table presents the CECONY O&M budget guidelines for the 2008 budget year.

CECONY 2008 O&M Budget Guideline

Item	2007 Budget	Rate Case Program Changes		Labor Escalation	2008 Guideline
		Gas	Electric		
Operations	\$745,343	\$10,859	\$111,734	\$12,920	\$880,856
Chairman and Staff	3,200	-	-	60	3,260
Auditing	6,400	-	-	140	6,540
Finance	36,609	274	1,333	730	38,946
Public Affairs	22,303	1,603	8,719	210	32,835
Law	21,700	86	708	420	22,914
Business Shared Services	62,703	280	1,011	1,250	65,244
Enterprise Shared Services	71,071	1,551	25,786	1,010	99,418
O&R Support	5,303	-	-	120	5,423
Insurance Premiums	26,700	900	4,016	-	31,616
Interference	90,200	1,019	24,105	-	115,324
Uncollectibles	49,000	1,000	3,000	-	53,000
Total	\$1,140,532	\$17,572	\$180,411	\$16,860	\$1,355,375

Thousands of dollars

The two preceding tables show increases in 2008 capital and O&M budgets to reflect, respectively, increased electric rate case programs of \$644 million and \$180.4 million. CECONY had filed in April 2007 for increased rates based on these exact levels of increases for the electric business for the 2008 calendar year. The budget guidelines issued in July 2007 included the full amount of capital and operating expenditure increases requested in the rate case as components of the budget targets for 2008.

2. Rate Case Impact on Budgeting

CECONY's planning and preparation for rate filings include many of the same elements as does its budgeting process. In both cases, new capital expenditure projects and incremental operating expenses above those of a base period are proposed. Depending upon the timing of the rate case filing, the rate case preparation and budgeting processes may overlap, or one process may forerun the other. Recent CECONY rate cases have featured forecasted rate periods of three years, as agreed in settlements among various stakeholders. For example, the electric rate case filed in 2004 addressed the three-year period from April 2005 through March 2008.

The company filed an electric rate case in April 2007, to be effective in April 2008. The three-year rate filing requested a \$1.2 billion increase in the first year. However, the public service commission required that the case be litigated and fully completed, rather than being settled. The result was a litigated, one-year rate decision covering nine months of 2008 and the first three months of 2009. Liberty focused on the relationship of the expenditure projects, programs and expense information and decision-making between the electric rate case and 2008 budget processes because of the common expenditure period they both addressed. The April 2007 filing exhibits addressed specific programs accounting for capital expenditures and incremental operating expenses above the levels included in 2007 rates. In preparation for a rate case, company departments must complete "program change forms" that measure actual "base" expenditure levels from a historic test period. All new programs, including capital projects,

incremental O&M programs and incremental operating expenses are requested in the rate case, and included in the exhibits to the rate case filing. Company managers generate the program-change forms; senior vice presidents and the COO then review them. The gathering of incremental projects and expenses for the rate case filing is similar to the budget process. In the case of the electric rate case filed in 2007, this rate case process would precede the 2008 budget process.

The company confirms that the information for the 2008 electric rate case filing and the electric portion of the 2008 budget were essentially the same. New projects and programs were added to the base expenditure levels of 2007. These projects and programs were first detailed and requested in the rate case filing. The same information was then included in the budget process a few months later. The company closely compares its budget expenditures to the rate case test period projections in order to maintain consistency between the rate case and the budget cycle.

As an example, the company maintains a capital expenditures model in the Controller's organization. For a rate filing in April 2007, the company would first identify projects approved in the five-year capital budget of January 2007. The company is required to file five years of projected capital expenditure information in its rate case filing. The project information in this long-term capital forecast is checked for changes, and new items are added by electric operations personnel. The capital expenditures model, including incremental capital projects and expenditures, is provided to the PSC staff along with the rate case. The additional projects and expenditures are summarized as exhibits in the rate case filing. The company notes that the public service commission also requires a tracking report on all projects that are approved in a rate case. The company tracks the amounts requested in the rate case, the company budgeted amount for the project, and the actual spending on the project in a capital spending true-up report filed with the commission.

Liberty requested the rate case exhibits showing incremental operating and maintenance expenses requested in the electric rate case for 2008, and as settled in the most recent gas rate case. The increases in electric operating programs requested were \$224.5 million per year (\$168.4 million represents nine-months of such an increase for the calendar year 2008). The company requested an additional \$12 million for inspection programs and receivables following the filing of the rate case, for a total electric increase request of \$180.4 million for calendar year 2008. This electric rate request total matches the increase in budget level for 2008, as shown in the preceding table. The 2008 increase in gas expenses approved in the last gas rate case was for \$17.6 million, which also matches the budget guideline increase for gas operations shown above.

For capital expenditures, the electric expenditures requested in the 2008 rate case are equal to the \$644 million increase included in the 2008 budget. On the gas side, the final decision in the gas rate case allowed an increase of \$97.2 million, the same increment included in the 2008 gas capital budget.

3. Bottom-up Budgeting

CECONY management employees in all budget-effected organizations develop bottom-up budgets in the July through September time period of each year. The budget process begins with the receipt of the budget guidelines in each major organization. As noted previously, the COO

and the Planning and Analysis group have allocated the total target capital and O&M expenditures among the various organizations based on historical spending patterns and the specific focus areas and requirements for the budget year. The bottom-up budget processes develop the specific projects, programs and overall work plan for each organization, based on its requirements for meeting company service, reliability, safety and other operating objectives.

The budget process includes at least three separate and distinct steps performed concurrently between June and September. The three processes include a revenue projection, a corporate expense budget, and departmental expenditures that include both operating and maintenance expenses and capital investments. Departmental expenses comprise by far the largest, most complex, and most important determinants of expenditures and current and future service levels.

a. Budget Processes Overview

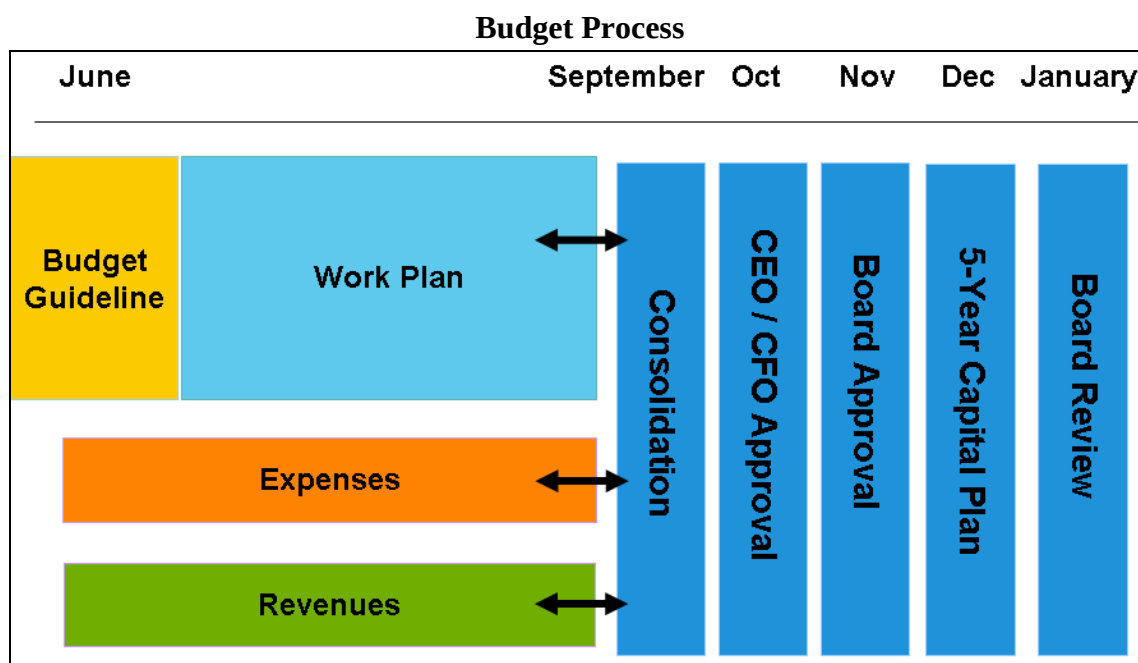
Following the receipt of the budget guidelines in each budget-responsible organization, budgets are developed from the bottom up. The revenue department within corporate accounting has responsibility for revenue forecasting, in conjunction with energy management. Financial forecasting and capital budgeting within corporate accounting has responsibility for the development of corporate expenses, which generally include the central office, administrative, regulatory and planning, and miscellaneous expenses required to operate the utility businesses. Financial managers in the electric operations, corporate operations, gas, shared services, finance, public affairs, law, and customer operations each develop “departmental budgets” from the bottom-up, as guided by their own goals and objectives and the spending guidance from the budget guidelines.

From mid-July to early August, corporate accounting gathers economic and historical data for the development of a preliminary budget forecast. Operating and engineering managers review and approve their departmental budgets, which are submitted to general managers for review and approval. The departmental budgets are then presented to organizational vice presidents for their concurrence and approval. Finally, the departmental budgets are submitted at the senior vice president level for approval.

From late August to early September, corporate accounting develops the generation, sales and revenue budgets. Concurrently, energy management and the steam business unit develop a preliminary fuel budget. The planning and analysis group consolidates these results with the corporate expense budget and the departmental budgets from each of the major organizations. The planning and analysis group coordinates and assembles budget information from all of the operational and support organizations in a consistent format and oversees the consolidation of the budget.

From late September to October, corporate accounting refines the revenue, corporate expense, and departmental expense budgets. A preliminary financing plan is developed for the budget year, and approved by the president. The entire budget package is submitted to the company CFO and reviewed by the Controller, CFO and CEO for approval. Following executive approval, the budget plan is then presented to the Finance Committee of the CECONY board. The one-year budget comes before the board for formal approval in November of each year. In December, senior management finalizes financing plans for the next year and takes a five-year forward view

of financing requirements associated with a capital-spending forecast. The capital budget results from a somewhat separate process from the revenue and expense processes described above. The preparation of the one-year capital budget occurs concurrently with the revenue and expense budgets; however, it is also part of a five-year capital plan that is consistently under development throughout the year, and is a specific focus of the CECONY board review and approval processes. The five-year capital plan and related financing plans are presented as a package to the board in January.



b. Revenue Forecasting

The revenue forecasting section of corporate accounting has primary responsibility for assembling revenue projections as part of the budgeting process. This section, in conjunction with energy management, gathers economic, customer and weather data for use in developing customer sales forecasts, send-out volumes from the CECONY generating stations, and the delivery revenue forecast. Energy management develops fuel and purchased power budgets that incorporate sales and send-out data, market conditions and CECONY's existing supply contracts and operations. Revenue forecasting personnel develop sales and delivery revenues based on this data.

The financial forecasting section develops net revenue projections by incorporating delivery revenues, fuel and purchased power budgets, and fuel rider revenues. Estimates of other operating revenues rely on forecasts of other regulatory revenue recovery and miscellaneous revenue items, such as late payment charges. The amount of revenue realized during the budget year from pending rate cases forms another key component of other operating revenues; full recovery of requested rate case dollars is necessary to offset the requested capital expenditures and incremental operating expenses included in budgeted expenditures.

c. Non-Departmental Expenses

The corporate expense budget includes items that are not under the control of or estimated in the departmental budgets for operating expenses. The company defines these corporate expenses as either not controlled by the operating areas or driven by regulatory or capital considerations. An assistant controller in corporate accounting coordinates the budgeting of these items -- gathering the estimates and projections from both external and internal sources. For example, the company's pension actuaries would be consulted regarding pension expenses. Corporate accounting also estimates property taxes and revenue taxes for budgeting purposes. This organization also estimates depreciation expenses and AFUDC by reviewing the most recent capital expenditure forecast for the budget year. The following table summarizes corporate expenses (excluding depreciation, amortization and taxes) budgeted for 2008. None of these expenses are included in the "O&M Budget" in the preceding table.

CECONY Corporate Expenses: 2008 Budget

<i>Employee Benefits</i>		Rents Retained by Corporate	58,715
Pension/OPEB – Net	\$79,408	Capitalized A&G	(46,415)
Health and Group Life ¹	87,818	Revenue offsets in Dept. Expenses	20,168
Thrift Savings Plan	19,928	Electric, Water, and Chemicals	25,468
Other Benefits	16,043	Obsolete Materials/Supplies	6,700
		Stock-Based Compensation	8,568
<i>Regulatory Accounting</i>			
DSM	94,187	Injuries and Damages	79,885
SBC	87,480	Regulatory Expense ²	40,478
RPS	28,626		
Gas Efficiency Program	12,500	All Other Miscellaneous	31,449
Other Regulatory Accounting	(623)		
<i>Other Expenses</i>		Total Corporate Expenses	\$650,383

Thousands of dollars

¹ Net of capitalized

² Excluding legal

Human Resources has primary responsibility for administering employee benefits. An annual report from an actuarial firm forms the basis for Pension expense and OPEB expense (\$79.4 million net). The accounting research group provides the actuaries with the information to prepare the annual actuarial pension and OPEB report. The total expense to be booked by the company was forecast to be \$200.7 million in 2008. However, about \$68.7 million of this amount is billed to shared services and to the New York Power Authority. In addition, about \$52.6 million of this expense is deferred. These two offsets produced a net expense of \$79.4 million. The total cost of Health and Group Life Insurance was forecast to be about \$134 million. About \$46 million of the cost was to be capitalized labor for capital projects, producing a net of \$87.8 million as the estimated expense portion for 2008. Treasury has input on administration of the thrift savings plans. The estimate of 2008 expenses (\$19.9 million) resulted from the application of a historical three-year average, adjusted by a trended growth percentage.

Regulatory Accounting recoverable expenses (totaling \$222 million net for the five categories shown in the preceding table) address required CECONY funding of NYSERDA. This pool

funds investments in demand side management, a renewable investment portfolio, and system benefits charges. The New York utilities jointly fund this pool.

The Rents category covers transformer vaults rental payments to New York City; other rents reflect costs for company facilities. Total rents were estimated at \$58.7 million for 2008. The company estimates that it will incur and transfer \$22.0 million of the charges to its operating groups such as electric operations, gas operations, and other organizations that use electricity and gas at company facilities.

The human resources, law, and environmental health and safety groups have responsibilities for costs in the Injuries and Damages category. These costs include workers compensation, insurance for public damages and insurance for environmental liabilities. The \$79.9 million estimate for 2008 arose from historical information for workers compensation and for the actual insurance premiums that cover the other two liability categories. The \$40.5 million for Regulatory Commission Expenses covers the amounts billed to the company by the public service commission.

Capitalized A&G (\$46.4 million) covers administrative and general expenses capitalized as part of capital projects, and thus transferred out of the expense budget. The \$20.2 million classified as Revenue offsets in Departmental Expenses represents an offset to departmental expenses for budget responsibility and reporting purposes. The \$8.6 million for Stock-Based Compensation represents the stock option plan for executive incentive compensation. Electric, Water and Chemicals expenses of \$25.5 million represent miscellaneous facility and other expenses not charged to the operating organizations. The \$6.7 million for Obsolete Materials and Supplies covers obsolete materials, such as cable from the end of spools and other waste materials not charged in the field operations. The All Other category (\$52.5 million) includes auditor fees, rating agency fees, incentive programs and other miscellaneous items. The company represents that these expenses are difficult to plan for and are not controllable by company organizations.

The company budgets these categories as corporate expenses primarily because they are not substantially “controllable” by any specific organization. Some of the employee related benefits expenses are charged out to other organizations, but a large amount remains as a corporate retained expense. The corporate expense category of about \$650 million in 2008 is effectively the remaining corporate expenses that have not been budgeted by the company’s operating and support organizations.

4. Departmental Operating Expense Budgeting

Most CECONY budgets arise from bottom-up processes within each operating unit. Budget processes differ among the various units, because each has developed a process specific to its own operating functions. Independent budget processes exist for:

- Electric operations
- Central operations
- Gas operations
- Customer operations
- Support organizations, such as the two shared service organizations, finance, law, public affairs, and several others.

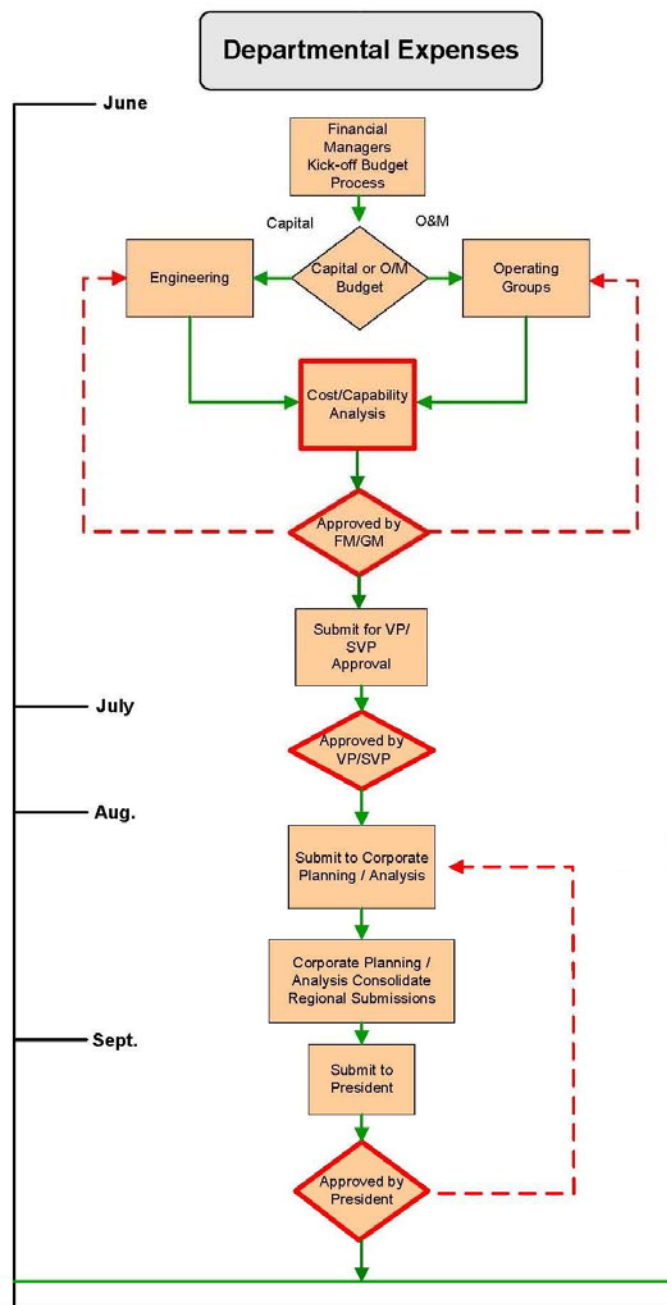
Each organization has its own process in place to meet the major work objectives of its functional responsibilities. Budgets eventually get consolidated when they reach the senior vice president level. Bottom-up budget development includes the estimating of work volumes, requirements per activity occurrence, required projects and programs, and estimates of both operating expenses and capital expenditures for most of the organizations. This section focuses on the processes for developing operating expenses in each area. The capital budget process (the subject of the following section of this report) runs on a parallel path.

Each organization develops a form of activity-based work plan to guide its budget development. For field operating departments, the work plan focuses on work volumes, man-hours required to complete specific types of jobs, and the dollars per man-hour required. The company uses what it terms “reasonable expectancy” (RE) measures to determine how much time is needed to accomplish a particular activity or task. The number of occurrences of each category of activity or task must also be estimated, usually based on the historical experience of the previous three years. Organizations also factor in efficiency improvements to incorporate new or enhanced technology, changes in design, increased workforce skills, and work process improvements. The company cited “computer aided dispatch” for service calls as a recent example of a technological efficiency. This dispatch method has the positive benefits of minimizing the use of paper, remote dispatching of work, and faster access to information such as mapping data.

The company estimates its required resources for each department or organization on the basis of the volume of work, the time needed to perform each activity, and efficiency improvements expected. Dollars are then assigned to the work plan, and a method of assigning costs is applied to determine the organization’s total budget. Depending upon the organization, the costs of performing the work plan may be directly charged to the estimating organization, totally allocated to other departments or organizations, or a hybrid of direct charging and allocation.

Operating budgets are reviewed by various layers of management prior to their organizational approval by the senior vice president. Operating budgets are initially compiled and estimated by field organizations from the bottom-up. The budgets then are reviewed, revised and approved at the manager or general manager level and subsequently at the vice president and senior vice president level. The organizational budgets are then submitted to the corporate planning and analysis department, which consolidates all of the organizational budgets into a consistent presentational format for submission to the company president. The table below shows a schematic of the departmental operating expense budgeting process.

CECONY Departmental Operating Expenses Budgeting Flow Chart



a. Electric Operations O&M Budgeting

Electric operations has responsibility for field operations, maintenance and emergency response of the electric distribution system. It divides its operations among four semi-autonomous regional units:

- Manhattan
- Brooklyn/Queens
- Staten Island

- Bronx/Westchester.

Each region has a section manager for financial control and operation analysis (budget manager) responsible for the coordination of the bottom-up O&M budget. The regional budget managers rely on the managers of sub-regions to provide the informational foundation for the O&M budget. For instance, the Brooklyn/Queens region has 12 managers who provide operations information for use in the budget process.

The regional budget managers receive a budget guidance memorandum that kicks off the budget process. The budget guidance provides an allocation of O&M dollars for each region; that allocation has been determined by electric operations upper management. The regional budget guidance sub-divides the budget guidance O&M allocation. The managers of each region then provide the units of work and hours required for each functional category and sub-category of work activities. The functional categories (FCATs) comprise the accounting categories for specific activities in distribution field operations. Some of the major O&M categories for distribution operations include emergency response (including emergency and non-emergency burnouts and emergency diesel generators), transformer inspections and repairs, tree trimming, underground inspections and repair programs, the stray voltage program, meters and testing, poles and manholes, and customer complaints and requests.

The regional budget managers discuss the units of work and the hours required for each functional activity that have been estimated by each of the regional managers. Three to five years of history for units, hours and emergencies are also reviewed, as well as special programs and situations in each manager's area. Mandated programs and work required to meet system specifications are also discussed. The result of the discussions with managers is to establish "reasonable expectations" for emergencies, units, and hours by function. An hourly labor rate is applied to the budget hours (which consist of the units times hours per unit for each activity) to produce the budget dollars for each category. Discussions with the regional managers form a key element in determining the prioritization for the O&M budget categories. Each budget manager compiles the "first cut" of the regional O&M budget by category, and submits it to the regional general managers.

The regional general managers review the first cut of the budget from the regional finance managers, including the initial prioritization of expenses. These general managers hold a meeting with regional engineers, operating managers and budget managers to review the budget and compare it to the budget guidance. Generally, the first budget request is more than the allocated budget guidance dollars. The managers are asked to cut some of their lower priority projects in order to get to the budget guidance. Generally, the result of this meeting and process is a budget that the regions and the regional general managers can agree upon. If the regional managers cannot agree, the issue is taken to the vice presidents of the regions and the senior vice president for a decision.

Electric Operations 2008 O&M Budget Request

Priority	SUB CAT	FCAT Description	Emergency Response	Employee Development	2008 Guideline \$
High	510	Burnouts/"b" Tickets - Overhead	6,734		\$6,734
	515	Burnouts/"b" Tickets - Underground	15,692		\$15,692
	517	Burnouts - Flush	6,995		\$6,995
	518	Burnout/emergency Related	48,884		\$48,884
	519	Emergency Diesel Generators	3,847		\$3,847
	520	Obstructed Ducts	469		\$469
	535	MAC - Burnouts	13,969		\$13,969
	560	Cinde - Inspections & Repairs			\$16,120
	565	Remote Monitoring			\$3,039
	580	URD Inspections			\$0
	600	Tree Trimming			\$16,317
	610	Joint Regulators			\$525
	660	OH Storm Emergency	325		\$325
	690	Inspections			\$6,982
	518	Street Lighting - OH/UG	262		\$262
	530	Street Lighting - assoc with BO			\$2,544
	570	UG Inspection Program			\$16,283
	571	UG Repair Program			\$7,020
	572	Stray Voltage Program			\$13,719
	635	Meter & Test			\$3,648
Medium	540	MAC - New Business			\$1,088
	630	Meter & Customer Work			\$2,640
	720	Transformer & Meter Expenses			\$3,480
	721	Disconnect/Reconnect Meters			\$3,247
	730	Customer Complaints/requests			\$8,440
Low	550	MAC - System Reinf.			\$2,153
	590	Overhead Facilities			\$1,182
	591	Osmose Pole Inspections			\$947
	620	Transformer Installations/Refurbish			\$2,235
	650	PCB Program			\$8
	670	Transf. (other Than Cinde)			\$9,049
	700	Other Repairs			\$9,134
	710	Permits			\$495
	740	Switching & Other Operations			\$2,922
		Total Distribution Field Ops.	\$97,177	\$0	\$230,394
		Engineering & Services		5,722	51,717
		Energy Services			10,888
		Energy Efficiency Programs			7,531
		Storm Contingency			5,000
		Total Electric Operations	\$97,177	\$5,722	\$305,530

The chief distribution engineer, regional general managers and financial managers, and planning & analysis compile a consolidated O&M budget for distribution operations for all of the regions. The total O&M request for the 2008 budget was for about \$305 million. The chief distribution engineer and regional general managers also re-prioritize the functional categories and spending levels for submission to the vice presidents and senior vice president as a formal request for the highest-level approval in the electric operations organization.

b. Central Operations O&M Budgeting

The 4,000 employees of Central Operations comprise a very large and functionally diverse organization. The primary operating units are:

- Central engineering
- Substation operations
- System and transmission operations
- Construction
- Steam operations.

The functions of these departments include operations, engineering and support, steam production and distribution, and construction services and activities. As a result, the budgeting for the costs of these units is also diverse. The O&M charges of some groups are directly charged, costs for others are mostly allocated, and a service group such as construction operations is charged out to other organizations or capital accounts by project. The total budget guidelines and requests for the central operations organization were about \$295 million in 2008. The O&M budget is prepared in the June through September time period. Presentations of O&M budget requests to the senior vice president are made in August and include KPI performance, reconciliation of the prior years' budgets vs. actual expenses, and prioritized O&M dollars requested. Each area also provides recaps of efficiency and productivity programs and their concerns and challenges for the budget year.

The central engineering organization provides engineering services to the entire company. Labor costs operate as the primary driver of the budget for this service organization. Almost all of the costs of the central engineering group are charged to capital projects or to the work of other organizations. The major budget categories included inspection programs, drawings, studies and analyses, general administration, and training and system support. Inside labor and consultant costs accounted for almost \$73 million of the \$82.6 million of gross expenses (before allocations) in the O&M budget request for 2008. The company finds budgeting for internal labor costs to be straightforward, but has more difficulty in estimating costs for the much more variable costs of outside services from consultants and contractors. Approximately \$8.7 million of the O&M budget was planned to be retained by central engineering.

The substation operations department has responsibility for everyday operation of the substations. The department employs a budget analyst in each of the four regional offices. Input from managers in the field drive the building of the substation O&M budget. The budget managers use an industry standard model ("Maximo") to estimate the units of work. Meetings with managers in June and July discuss the units of work and hours per work activity. Total cost estimates for each line of the budget follow. First priority O&M items include labor for operations, including labor and trip checks, calibrations, circuit breakers, transformer repairs and

seasonal preparation. These first priority programs totaled about \$47.5 million for 2008. The second and third priority areas for substations are preventive and corrective maintenance. The total substation budget request for 2008 was about \$98 million. The substation operations budget managers estimated and prioritized 105 specific activity items in their budget request.

System and transmission operations includes system operations, transmission planning and transmission operations. The system operations 2008 O&M budget was about \$24 million. Labor, which has been fairly stable, comprises the bulk of this department's budget. Transmission planning, another department whose costs are heavily labor related, had a 2008 budget of about \$3 million. Activities such as manhole inspections and other maintenance and program work drove the 2008 budget for transmission operations (about \$25 million). Emergency operations (*e.g.*, transmission failures and feeder leaks and failures) also drove a portion of the budget. The system and transmission operations department prioritized 57 O&M programs, whose total equaled its budget guideline of \$51.9 million. Only three proposed programs were outside of the budget cut line for 2008.

The approximately 1,200 employees in the maintenance and construction services department perform construction management, construction services, substation and transmission construction, public improvement (interference), and environmental health and safety work. The total O&M spent for all of the functions is approximately \$160 million; construction services accounts for approximately \$50 million of this total. Construction builds approximately \$1 billion in facilities per year for other CECONY organizations. Construction charges out almost all of its costs to other CECONY units, which therefore take budget responsibility for the costs involved. The units for whom the work is performed also manage the expenditures involved. Construction services retained (*i.e.*, did not charge other units for) comprised only about \$7.6 million of its 2008 O&M budget request.

This department also has responsibility for public improvement work, which is more commonly referred to as "Interferences." It does not bill other departments for this work, which remains within the department's budget responsibility. The public improvement group includes engineers, constructors, and other employees, who work in conjunction with New York City or other municipalities when public projects affect CECONY facilities. When an agency performs work in the vicinity of CECONY facilities (*e.g.*, installing a sewer or water main), the utility must bear the costs to move, replace, or protect its facilities affected by the proposed construction activity. Public improvement personnel have responsibility for mitigating direct and indirect interferences. They address direct interferences with city facilities by negotiating a revised plan with the municipal engineering personnel or by relocating company facilities to accommodate the proposed agency facilities. Negotiating the revised plan generally requires O&M expenditures; facility relocation generally requires capital expenditures. The public improvement group has an O&M interference budget of about \$115 million (\$93 million for electric, \$19 million for gas, and \$3 million for steam).

Steam operations includes both steam production and the Manhattan steam distribution system. Central operations determines an O&M allocation from the budget guidelines for steam production and distribution. The budget development process starts in May of each year with the preparation of bottom-up budgets from about 12 steam managers. The managers are responsible

for developing their O&M requirements. They prepare both an annual and a two-year O&M budget, using the previous year's budget as a starting point. Each of the managers prepares prioritized capital and O&M budgets. The manager's budgets are reviewed and compared to the budget guidance by the budget manager for steam operations. The first priority items are labor for operations in each of the steam facilities and emergency response. The next priorities are for water treatment, environmental expenditures, boiler cleaning, corrective maintenance, facilities maintenance and major overhauls. Steam operations prioritized its O&M expense categories up to the budget guideline of about \$125 million for 2008. Eventually, about \$3 million in additional expenditures was approved for the final budget. Steam operations also identified a number of concerns and challenges relating to the age and condition of the steam distribution system and potential rate recovery problems for significantly increased capital and O&M expenditures.

c. Gas Operations

The gas operations budgeting process begins with the development of the organization's specific work requirements. The budget manager begins by collecting historical O&M programs and dollars, and then supplements them by gathering from gas section managers additional information about specific work required in the budget year. Public service commission and code requirements comprise the dominant drivers of the program items in the O&M budget. All but a few of the O&M programs address such requirements. The budget managers also determine the man-hour rate for estimating labor expenses, which form the largest component of O&M expenses. The man-hour rate includes the costs of supervision, building occupancy, communication, tools and support. The man-hour rate uses productive hours (*i.e.*, net of vacation, holidays, sick time and training), which average between 1,400 and 1,500 per year.

The gas section managers prioritize their O&M budget items. The gas operations budget manager compares O&M programs and dollar requirements with the budget guidelines. The prioritization list that has been generated serves as the basis for the first cut at the budget. The bottom-up budget is pared to equal the top-down budget guidelines. Those guidelines equal the dollars approved in gas rates. The gas vice presidents and senior vice president subsequently review and approve the bottom-up budgets.

Gas operations made an approximately \$89.3 million total request for its 2008 O&M work plan. It classified about \$68 million as first-priority items (*i.e.*, code-mandated work). Leak repairs, gas engineering and control, emergency response, pressure control, the emergency response center, and service transfers and cutoffs comprised the largest first-priority O&M program items. The budget request classified about \$18 million as second priority work, which is required to operate and maintain the gas system. The third priority items fall into a discretionary work category; the budget request contained only about \$3 million for such work.

d. Customer Operations

The large customer operations organization has responsibility for meter reading, customer calls, collections and credit, service starts and terminations, customer advocacy, AMR and theft cases. Labor comprises the primary driver of its budget. The 28 section managers tend to use historical unit levels plus known changes in building bottom-up preliminary budgets. The senior vice president meets with each general manager and manager individually to discuss their units of

work and priorities for the budget year. The total group tries to stay within the top-down budget guidelines for the year. The final customer operations O&M budget for 2008 was about \$161 million. The customer operations O&M budget is not prioritized. Management considers very little of the O&M budget to be discretionary and almost all of the customer operations O&M to represent a high priority, with little flexibility for reductions because mandated call times and service levels must be met.

e. Other Labor-based Support Organizations

Several service and support organizations have O&M budgets that consist mostly of labor charges. These organizations include business shared services, enterprise shared services, law, public affairs, finance, auditing and the chairman's office. The 2008 O&M budget for all of these organizations was approximately \$275 million. The two shared services organizations accounted for about \$165 million of this total. The general approach to estimating O&M expenses in these organizations is to allocate dollars to the various departments based on their proportion of the previous year's budget. The budget guidelines are based on historical O&M budget spending plus wage adjustments and less a 1 percent productivity factor. The impacts of rate case filings and decisions as well as new programs to be implemented must also be taken into account.

The enterprise shared services organization is responsible for emergency management, energy management, facilities, human resources, resource and development, EEO, and security and investigations. A second shared services organization is called business shared services, which is responsible for purchasing, information technology, transportation and materials and stores. Enterprise shared services includes a large rate case increase of \$25.8 million in its 2008 budget guideline, which is mostly attributable to the renovation, reconfiguration and space rentals for the CECONY headquarters building refurbishment.

Managers and executives in the support organizations note that their O&M budgets are fairly firm, with little flexibility for change. The O&M budgets were prioritized in most of these organizations, with the exception of the services administration O&M budget. The company notes that O&M prioritizations were prepared in all of the shared services organizations for the 2009 budget.

5. The Capital Budget

a. Process Overview

CECONY capital budgeting is critical in determining investment in fixed utility assets and infrastructure. The company's capital budget has increased markedly in the last few years; it totaled approximately \$2.5 billion in the 2008 budget. CECONY also plans to spend a similar level for at least 2009 and 2010, and a minimum of \$2.2 billion per year thereafter. The processes and procedures for determining the projects, programs and spending levels for capital investments were thus a primary focus of this audit.

CECONY corporate instruction procedure (CI-610-01) defines the overall CECONY capital budget process. The purpose of the process is:

To specify the procedures to be followed for construction projects, to achieve project authorization (budget allocation), appropriation of funds, and funding control within the yearly capital budget.

The procedure describes the capital budget process as being composed of the following steps:

- Project Authorization
- Project Appropriation
- Increase/Decrease of Authorization/Appropriation
- Capital Budget Status Reporting
- Validation in Advance of Appropriation
- Funding Control.

Liberty sought to determine the actual steps and processes that lead to a project's or program's authorization by the CECONY board. The actual observed capital budgeting process includes several preliminary steps that must be met. Liberty found this pre-authorization process to have the following steps:

- Project identification
- Project analysis/justification
- Initialization
- Prioritization
- Allocation/funding
- Executive approval
- CECONY board authorization.

This section of the report focuses on how the company identifies, analyzes, prioritizes and presents the capital budget for approval by executive management. The effectiveness with which the company selects the most advantageous capital expenditures is an important determinant of its ability to build required utility facilities and infrastructure at the most reasonable cost possible over the long term.

The capital budgeting process varies among the CECONY functional organizations. Liberty observed at least four different capital budgeting processes in individual organizations below the senior vice president level. The capital budgeting processes for electric operations, central operations and steam, gas operations, and the common capital budget are each unique in how the responsible managers identify, analyze, prioritize, and allocate funds for capital expenditures. Senior vice presidents review capital budget requests for groups under their responsibility. Following approval at the senior vice president level, the corporate planning and analysis organization consolidates all units' capital budget requests. The COO and CEO give final approvals to them in time for consideration and approval by the board in November of each year.

What CECONY terms authorization, funding, and appropriation all have a material role in allowing funds to be spent. Authorization constitutes a board endorsement of the project or program. The approval of the annual capital budget establishes the budget year funding levels for projects and programs. An appropriation provides permission to expend or obligate funds for the authorized project or program. The CECONY board approves the authorization levels and the annual capital budget. Appropriation is then approved by the required level of management (as

determined by the company delegation of authority procedure). Once these three phases are completed, responsible officers of the company may begin to expend funds to implement the project or program. The following discussion describes the bottom-up processes in each of the four categories of capital expenditures that lead to presentations to the CECONY COO for approval.

b. Electric Operations

Electric operations receives top-down budget guidance for capital expenditures for five years; for budget purposes it focuses on the first two years as being the most important and relevant. The total electric operations capital expenditure dollars have been allocated to the four regions based on historical spending. The engineering groups in each region conduct distribution system load relief and reliability studies to determine specific system reinforcement requirements on the low- and medium-voltage distribution systems, based on the budget year peak day forecast. The studies use what is called the poly-voltage load flow model (PVL), which each region as well as the distribution engineering group operates. The PVL studies incorporate recent, actual summer peak load data, apply location-specific customer growth and new construction expected in the budget year, and overlay a projected demand forecast. The PVL model produces the loading on all system components to identify overloads, voltage problems, and other operating problems. The regional engineers, working under the guidance of the chief distribution engineer, consider a number of options to relieve the overloads on the primary electric system, including:

- Replacing of limiting wire and cable
- Transferring of load to other feeders or networks
- Installing of capacitors or voltage regulators
- Balancing load among feeder legs
- Increasing substation capacity
- Bifurcating existing feeders
- Establishing new feeders, networks, or substations
- Converting to higher voltages
- Installing tie switches for load transfer.

Many load-relief remedies involve load transfers among feeders and transformers. Overloaded transformers are identified and load relief options are also considered. Transformers loaded to more than 125 percent of capacity comprise the highest priority items in this category. Projected volume and costs (based on historical property record account information and unit costs) drive preliminary estimates for load relief work that the regional engineers prepare. A load relief plan developed for each region identifies all reinforcement projects required.

The PVL model does not provide the only source for identifying load-relief projects. Distribution regions also identify what types of expenditures are required to meet specific company requirements (*e.g.*, safety or public service commission mandates) or a specific system need. The corporate-wide Enterprise Risk Management (ERM) process identifies unacceptable outage events and major system risks. ERM-driven programs in electric operations include stray voltage testing, transformer failure mitigation through inspections, and the vented manhole covers program designed to mitigate manhole explosions.

A large portion of the capital dollars expended in electric operations go to routine or blanket capital expenditure categories that the company refers to as “capital programs.” Each budget cycle includes a large number of similar work activities performed in each category of capital programs. Capital programs address everyday occurrences (*e.g.*, emergency burn-outs, new customer additions, equipment replacements and special safety programs). Emergency response capital programs include emergency primary cable replacement, emergency overhead repairs, street light services, temporary services, and transformer installations. Other major capital programs include transformer purchases, new business connections, interference expenditures, secondary system open-main repairs, paper insulated lead-cable replacement, and meter purchases and installations. Each budget line-item program has at least one budget reference number and regional estimates of required work units, hours, and dollars. Meeting SAIFI or CAIDI criteria comprises the justification for including many of these programs in the capital budget. Historical occurrences, such as emergency burn outs and various categories of emergency response, justify other capital programs. Emergency response programs assume that replacements rather than repairs of damaged sections will be performed for budgeting purposes; in the field, a repair is rarely performed.

The company also performs extensive modeling to identify system-reliability capital projects and programs. Reliability projects flow from the use of a 10-year network reliability model. This predictive tool performs a Monte Carlo simulation of CECONY’s electric distribution networks. The model is run annually after it has been updated with the most recent summer peak load information and failure rates. The model provides a relative network ranking of the jeopardy of network failure. Twenty-one networks are identified as the lowest performing of the 60 networks on a net reliability index (or years to network failure sensitivity). Ranking and programmatic improvement of the most vulnerable networks began in 2008; the Long Island City outage occasioned this development. The company sets a goal of one network shut down probability in approximately 20 years. Planning then focuses on the worst one-third of the networks.

Distribution engineering assesses the reliability of all the most vulnerable networks, and has prepared a book providing the distribution regions with guidance for their reliability projects addressing the 21 most vulnerable. The assessments considered four specific options:

- Feeder bifurcation or splitting, which would cut a failure risk in half with the installation of breakers
- New substation construction, which would entail a capital investment probably in excess of \$200 million
- Installation of underground sectionalizing switches in order to isolate failures (the least expensive of the four on a current outlay basis)
- Replacement of the paper insulated lead cable in the network.

A “capital budget request form” initiates requests for approval of specific capital projects in the annual capital budget. The forms initiate appropriations of previously authorized projects. The capital budget request form also seeks approval for increases or decreases in existing authorizations or appropriations.

The distribution region managers prepare a first-cut of the distribution engineering capital budget. They prioritize capital items in accordance with distribution engineering specification

EOP-5314, which guides budget prioritization throughout electric operations. EOP-5314 provides for the following capital budget prioritization categories:

- *Priority 1:* Public and employee safety programs
- *Priority 2:* Customer demand and emergency response (load relief)
- *Priority 3:* Regulatory/environmental excellence programs
- *Priority 4:* System reliability and reinforcement
- *Priority 5:* Strategic information technology initiatives.

The following instructions supplement the five priority categories for the key areas of load relief and reliability programs:

...the annual feeder and transformer relief shall be prioritized based on highest to lowest overloads and associated individual risk evaluation of each component... For load relief projects each region shall provide a list indicating the magnitude of the overload or undervoltage, estimated cost, percentage loading compared to current component rating and expected improvement after relief is completed... For reliability programs and projects, each region shall provide a description of each project or program indicating the cost and expected improvement in system performance. Networks with the lowest reliability index should receive priority in funding the project. Non-network programs or projects will be prioritized based on a maximum system performance impact for the dollars to be expended.

Meetings including distribution engineering, regional engineers, general managers and regional budget managers determine the priorities for budget items among the regions. This group examines the entire list of requested expenditures, and seeks to keep total capital spending within the budget guidance level. It does so by cutting the necessary number of comparatively lower-priority budget items. The chief distribution engineer finalizes the bottom-up capital budget prioritization. The region vice presidents receive and review the results of this process. Their recommendations then undergo final review by the senior vice president. The left column of the next table shows the bottom-up capital prioritization.

Electric Operations 2008 Capital Prioritization

Priority Number	Priority	Description	Original Rate Case Capital Budget	2008 Revised Prioritization	2008 Revised Budget with \$65M Reduction
1	High	Primary Cable Replacement (OA's)	35,536	56,228	57,547
2		Emergency Overhead Repairs	8,267	14,267	15,353
3		Transformer Installation	23,279	21,716	25,171
4		Transformer Purchases	143,648	129,648	125,592
5		Interference	30,900	30,900	30,900
6		Street Lights (Incl. Conduit)	15,253	15,253	16,193
7		Vented Manhole Cover	8,000	3,000	3,000
8		New Business (Over & Under \$100K)	125,000	137,000	137,000
9		Meter Purchases	11,967	11,967	11,967
10		Meter Installation	19,320	19,320	19,564
11		Area SS Overloads	57,233	57,233	68,135
12		Primary Feeder Relief	40,497	49,350	43,493
13		4 kV Feeder & Wire Relief (Part of Primary Feeder Relief)	10,605	10,605	7,249
14		Network/Non Network Transformers >125%	15,525	26,364	33,480
15		Network transformer replacements >115% <125%	25,913	27,825	30,826
16		PILC	39,200	33,000	33,000
17		Secondary Open Mains	92,327	134,811	123,333
18		Temporary Services	16,053	20,053	20,115
19		Underground Secondary Reliability Program	68,296	68,296	33,334
20		Remote Monitoring Transmit Meters Pressure Temperature/Oil	20,645	20,645	17,845
21		Secondary Visualization Model	5,200	4,000	2,900
22		Sectionalizing Switches	3,468	3,468	3,208
23		Network Reliability	18,909	18,909	18,441
24		Grid Optimization (CALM)	1,800	919	900
25		Street Light Isolation Transformers	10,950	-	4,100
26		Tap Changer Position Indicator System	0	-	-
27		Temperature Gauges	0	-	-
28		Frame Relay (Enhanced 4 kV Grid & USS Battery Monitoring)	0	-	-
29		Auto Reclose On Bank Breakers At Various USS	0	-	-
30		Secondary Monitoring (Secondary Model Validation)	10,400	2,000	2,000
31		Decision Aids	1,500	1,500	1,500
32		Area Profile System	100	100	100
33		High Tension Monitoring Data Acquisition System (HTMDAS)	500	500	500
34		Integrated System Model	3,000	2,000	1,750
35		Accounting by Network	350	1,000	1,000
36		Heads Up Display	0	1,000	1,000
37		2007 Decision Aids Grid Ops & ISM	0	500	725
		Sub-Total High Priority	863,641	925,377	891,221
38	Medium	HiPot	6,303	6,303	3,310
39		USS Load Relief	0	-	-
40		4 kV Substations - Reliability	111	111	111
41		Targeted Primary DBC Replacement	800	800	2,588
42		NonNetwork Fdr Relief (Open Wire)	3,000	3,000	8,362
43		Osmose	-	1,220	1,404
44		Autoloop Reliability (Includes 27Kv)	-	5,450	4,975
45		Overhead Transformer Relief	-	2,192	1,042
46		Anderson Switches	-	63	63
47		Aerial Cable Replacement	-	613	500
48		#4, #6 Self Supporting Wire	-	2,314	2,301
49		Overhead Reliability	-	1,848	1,848
50		4 kV Feeder Sectionalizing/ Add1 Kyle	-	306	306
51		Additional 13 kV Feeder Sectionalizing	-	97	(0)
52		Automated Emergency Ties	-	750	-
		Overhead Enhancement	21,852	14,852	12,438
53		Oil Minders	600	600	600
54		4 kV UG Reliability	1,268	1,268	500
55		System Trouble Analysis and Response (STAR)	500	1,000	1,000
56		Secondary Main Relief	2,150	2,150	1,150
57		Network Transformer Replacements >100% <115%	51,466	5,503	-
58		Shunt Reactors	2,727	2,727	227
59		Coastal Storm Mitigation	6,460	6,460	3,000
60		Rear-Lot Pole Elimination	0	-	-
61		SSM/4kV Feeder Breakers	0	-	-
62		ATS Installation USS Reliability	1,050	1,050	1,050
63		USS Automation	0	-	-
64		USS Transformer Replacement (Spares)	0	-	-
65		4kV USS Switchgear Replacement	0	-	-
66		USS Life Extension Program	0	-	-
67		Distribution Engineering Workstation	0	-	-
68		Pole Attachment Project (PAA)	0	-	-
69		Joint Pole Use Software	1,850	1,850	1,500
70		All Other Carry Over System Reinforcement IT Projects	0	-	-
71		Work Management	0	-	-
		Sub-Total Medium Priority	100,137	47,674	35,836
72	Low	Known Point Splice	0	-	-
73		Grounding Transformers	2,519	2,519	1,226
74		4kV Cable Replacement	4,961	4,961	-
75		Telecom	2,013	-	-
76		ESCO Switch Replacement (Kyle)	2,485	2,485	2,000
77		3 Phase Gang Switch Replacement	400	400	-
78		33 kV Interruptible Switches	160	160	-
79		Overhead Secondary Reliability Program	500	500	-
80		Intelligent OH DAS Autoloop System	2,500	2,500	-
81		URD Cable Rejuvenation/Fault Indicator	608	608	-
82		House Isolation Transformers	1,760	-	-
83		Trip Coil Monitor	0	-	-
84		Facility Improvement Program	0	-	-
85		4 kV Disaster Recovery	0	-	-
86		NWT Failure Analysis - Polytechnic	489	489	-
		Sub-Total Low Priority	18,395	14,622	3,226
		Sub-Total Electric Distribution	982,173	987,673	930,283
		Distribution Substations	15,940	15,940	13,940
		Total Electric Operations	998,113	1,003,613	944,223
		Common	19,469	13,969	9,869
			1,017,582	1,017,582	954,092

c. Central Operations

The large central operations organization has responsibility for budgeting and implementing many of the major CECONY capital projects. This organization generates capital projects categorized into the following areas: substations, transmission systems, steam production and steam distribution. Load relief programs, obsolescence programs, reliability programs, environmental programs, regulatory requirements, failed equipment, and requests made of the central engineering organization drive the identification of this organization's capital projects.

Substation and transmission investments comprise the largest portions of central operations' capital budget. A number of studies that evaluate needs to increase system capacity serve as a source for identifying required substation and transmission projects. An annual distribution system load relief and reliability study (the PVL model) comprises one such study. Distribution engineering performs the PVL study, which also identifies distribution load-relief requirements, as discussed above. A 10-year substation and transmission system load relief and reliability study comprises a second major study used to identify substation and distribution requirements. This study employs a forward-looking 10-year load and capacity analysis of all area substations and the associated supply feeders, comparing load and capacity levels to planning criteria. This effort identifies the timing, location and nature of reinforcements required over the following 10 years to ensure reliability under design contingency conditions.

Substation and transmission projects require a much longer planning period due to the long lead times required to acquire property, procure specialized required equipment and to design and construct the facilities. These projects require considerable coordination and negotiation with a variety of external stakeholders.

A third study (a detailed analysis of system demand growth, system performance and proposed system enhancements to determine their air impact on system reliability) also occurs as a routine part of efforts to identify needed substation and transmission projects. This study applies a probabilistic reliability analysis (PRA) model. This model identifies options for new and replacement facilities to improve electric reliability and overall system performance. The transmission planning group supplements the aforementioned studies with an evaluation of the impact of the demand forecast on the transmission system. This evaluation attempts to determine whether equipment overloads or load pocket problems will result from the application of corporate demand and load projections.

Central engineering, substation operations and system and transmission operations groups use these various information sources to jointly develop a set of potential substation and transmission reliability programs. They create a listing of candidate programs for inclusion in the proposed capital budget. The listing provides a description of each program, its justification, estimated completion date, current status for ongoing programs, and expected funding requirements. Each of these reliability programs go into the overall central operations capital budget request, and each has an assigned priority within the individual substation and transmission department.

The development of the most effective solutions or options to meet identified substation and transmission capacity needs remain within a number of general parameters. First, potential solutions for projected future overloads on these portions of the CECONY system seek to

minimize the capital investment required to maintain system reliability. Potential solutions may include operating solutions, upgrades to existing equipment, demand-side management, transfers on the distribution system, the installation of new distribution system equipment, the installation of new substation equipment, and the construction of new substations and transmission facilities. Second, each proposed solution to a projected overload considers project cost, time required to construct, and the resulting impacts on area and system reliability. Solutions using operations or equipment modifications to resolve near-term overloads are frequently selected when available, because they generally provide the least expensive alternative. Finally, the comparatively very high cost of constructing new facilities such as substations essentially makes them a viable option only when less expensive alternatives have been exhausted or do not exist.

The central engineering organization and the sponsoring engineer perform an “order of magnitude estimate” for each capital project identified. Exact location and property purchase requirements fall among the uncertainties that such estimates must address. These estimates include major components (*e.g.*, transmission equipment, permits and labor). Central engineering applies experience from previous projects as an important source of information for developing these estimates. The ensuing capital budget request form that requests project authorization recognizes the roughness and incompleteness of the order of magnitude cost estimate. The analysis of alternatives to the project will have been performed prior to the time of these requests.

The identification of such projects, and even their inclusion in budgets, does not halt the process of seeking short-term alternatives that may defer or alter them. For example, Liberty examined the analysis leading up to the authorization and re-authorizations for the Parkview substation project. The original project gained approval in November 2002 (as part of the 2003 capital budget) with an order of magnitude estimate of \$85 million. The output of the 10-year load relief model identified needed area load relief, and provided the justification for this original authorization. However, the company replaced limiting feeders, installed additional transformer cooling, and implemented temporary load transfers from 2003 through 2007 to meet area system needs. These activities resulted in a delay in Parkview’s entry into service until 2008. During this period, planning activities continued to examine and estimate other temporary measures as well, recognizing the likelihood that continuing area load growth would eventually leave a new substation as the only measure to provide permanent relief.

Parkview also shows the dynamic nature of project cost estimating. A 2005 updated authorization increased the Parkview project amount from its initial \$85 million to \$200 million. The estimate made at that time found the project in the design stage. According to the company, economic analysis was not required to justify the increase in the authorization. However, the re-estimates of the substation costs did require explanations for each component cost increase. The company notes that it was committed to the project and had already procured sites and invested capital dollars in the project. Generally it always proceeds with projects that have reached this stage. The justification for the project (load relief) had not changed, and shorter term sources of relief were gradually being exhausted. Continuing engineering reviews and the identification and pursuit of short term alternatives to exhaustion represent key elements in the process of justifying projects of this type. The project authorization increased further, to \$250 million, in 2007.

Credits for cable and AFDC produced a final current working estimate of about \$222 million for Parkview, which went into service early in 2008.

A set of “17 attributes” has formed the basis for prioritizing all capital expenditures in the central operations organization for some time. The next table shows these attributes and their weighting.

CECONY Central Operations Attributes for Prioritizing Capital Projects

Attribute	Weight	Attribute	Weight
Safety/Health	15%	Operational Technical Improvement	5%
Demand Relief or Capacity Change	15%	Efficiency	5%
Reliability MTBF or % Overduty	7.5%	Carryover of Work in Progress	5%
Availability	7.5%	Structural Restoration	5%
Regulatory or Environmental	7%	Public Perception	4%
Obsolescence	7%	Outage Availability/Coordination	2.5%
Cost	6%	Strategic Issue	2.5%
Technical Improvement	5%	Report Recommendation	1%

The weight of each attribute may be adjusted (by plus three to negative three percent) due to the project’s relative importance in affecting the individual attributes. Projects developed to address regulatory or legal compliance issues or for meeting customer demand receive the highest priority, because CECONY considers them to be mandatory. Next in priority order come projects associated with maintaining or improving system reliability. Third order priorities consist of projects developed to address longer-term issues, such as system aging and obsolescence.

Steam production, electric production and steam distribution departments also form part of central operations. The twelve managers in the steam operating departments initiate capital budgets for steam operations. Central engineering allocates the amounts available for these projects from the capital budget guidelines. Each manager prepares a prioritized capital budget that applies the 17 prioritization attributes. Central engineering also receives from the steam departments engineering requests for specific project needs. The steam budget manager consolidates and summarizes capital budget requests for review and approval by the steam operations vice president and the senior vice president. The steam distribution capital budget request for 2008 totaled \$27.5 million. The budget manager noted that the 41st Street steam incident caused a \$16 million capital expenditure addition to this request to address new mandates and recommendations to address the incident’s root causes. The steam production budget request was about \$51 million and the electric production budget request about \$36 million for the 2008 capital budget, for a total of about \$115 million for the total steam operations.

d. Gas Operations

Gas operations uses the following two long-term strategic plans for its system and its three year rate agreement to guide capital budget development:

- Supply system master plan
- Transmission system master plan.

The chief distribution engineer and the chief transmission engineer direct the preparation of the gas capital budget. The gas engineering groups provide all of the analysis required to justify capital budget items. Gas engineering uses the SynerGEE gas network analysis software to model the gas transmission and distribution systems. These models analyze system pressure and flows to:

- Evaluate the impact of planned work
- Plan for future infrastructure reinforcements
- Evaluate the effects of new system loads
- Prepare for emergency contingencies.

Gas transmission system capacity is evaluated using winter distribution loads and the winter and summer requirements of power generation customers. Contingency studies for the gas transmission system assess the impacts of the loss of gate stations and other key facilities. These contingency studies identify response actions and reinforcement projects needed to minimize or eliminate the impacts of the identified contingencies.

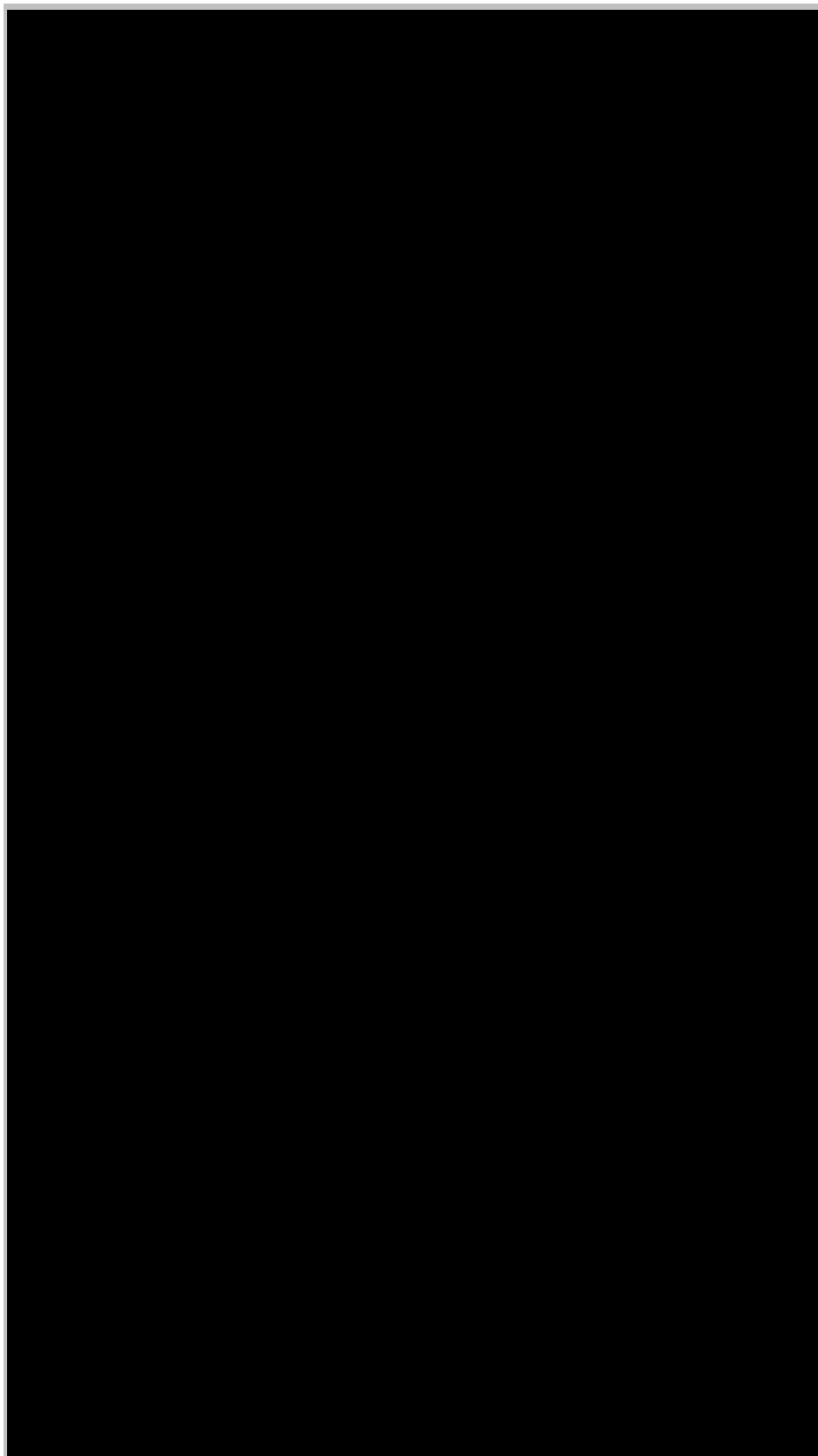
CECONY also evaluates the capacity of the high, medium, and low pressure distribution systems in each of gas operations' four regions. Each region must meet customer loads during the peak design hour. Gas operations also uses actual pressure readings taken from the field to update annually its various distribution network models to the coldest day. Extrapolating these loads to design hour conditions provides a basis for identifying areas requiring reinforcement. Ensuring that the distribution systems can deliver minimum gas pressures on a design day serves as the basis for identifying needed projects.

The gas mains replacement failure analysis model comprises another key modeling effort that drives the budgeting process. British Gas initially developed this leak-prediction model primarily for steel pipe systems. CECONY uses its leak prediction capability to develop a main replacement plan. The model prioritizes replacement main sections by condition and by risk. Historical leak and repair data drive the assignment of condition and risk designators for each section. The current gas rate case agreement (for 2008-2010) requires that the company replace 40 miles of leak-prone mains per year. The gas mains replacement model identifies most of the mains budgeted for replacement under this requirement.

Gas operations budgets include both capital programs and individual projects. The annual capital programs approved in aggregate include:

- GD-1: new business, meters, and system reinforcement
- GD-3: leaking service replacement
- GD-4: steel main replacement.

An authorization and appropriation process similar to the one used in electric operations and central operations applies to individual capital projects. Gas operations also uses a specification for the prioritization of gas projects, under which it ranks projects in priority order. The next table shows the 2008 gas operations capital budget request (not the final approved budget).



An order of magnitude estimate serves as the basis for authorizations for new projects. The gas planning vice president requires a summarized one-page justification for each proposed project and an evaluation of alternatives. The gas vice presidents and senior vice president review authorization request documentation; following their approval, the final documentation becomes part of the overall budget submission to the CECONY board.

e. Common Capital Budget

The common capital budget includes investments in strategic IT projects, facilities, and general equipment (including vehicles, computers, telecommunications and lab equipment and tools). The business shared services organization oversees the coordination, budgeting, and purchase of common capital items by organizing and coordinating requests from several other organizations.

Strategic IT projects include requests from various parts of the company that go through a central IT committee. The IT vice president and all of the senior vice presidents discuss all IT capital requests. This group prioritizes the IT capital projects among the organizations. They jointly set a budget cut line. Strategic IT projects are budgeted for electric operations, customer operations, central operations, gas operations, finance and law, business shared services and enterprise shared services.

Customer operations require the largest dollar strategic IT projects. Customer operations has been implementing a five or six year long automatic meter reading (AMR) program in Westchester County. The 2008 capital budget request for this program amounts to about \$30 million. A cost-benefit analysis prepared by the capital budget group in the controller's organization justified this AMR program. First-year costs for an advanced meter infrastructure (AMI) project comprised another major project in the 2008 budget request. The expected duration of the full AMI project runs six to seven years and its cost would amount almost to \$1 billion for the entire CEI service territory. The \$43 million for the first stage of the AMI project (included in the 2008 budget) did not secure approval in the recent electric rate case. Customer operations also has a strategic IT project category that includes expenditures such as a steam billing system and the redesign of the existing billing system.

Vehicles, computers, and facilities comprise other major categories in the common capital budget. The business shared services organization budgets each of these categories. The next table shows the 2008 common capital budget request of \$314.3 million in the first column.

Common Capital Budget Summary

			Variation
	2008 Current Plan	2008 PSC	2008 Current Plan vs. Rate Case
Facilities			
Third Avenue Yard	6,200	6,200	0
Facility Flush Improvements	0	0	0
Electric Incident Command Center	0	0	0
Hurricane Hardening of Facilities	0	0	0
Security (Transferred from WTC)	0	0	0
Astoria Dock A11 & A12	0	0	0
All Other Facilities Projects	46,103	46,103	0
Total Facilities	\$52,303	\$52,303	\$0
Strategic IT Projects/Common			
Electric Operations IT Projects	19,469	11,247	(8,222)
Customer Operations AMR	30,158	30,158	0
Customer Operations AML	42,939	0	(42,939)
Customer Operations AML (Meter Purchases)	0	0	0
Customer Operations Strategic IT/Other Projects	17,254	16,819	(435)
Gas Operations IT Projects	0	0	0
Central Operations IT Projects	4,050	4,050	0
EH&S IT Projects	1,000	1,000	0
Subtotal Capital Operations	114,870	63,274	(51,596)
Finance & Law IT Projects	9,250	9,250	0
Business Shared Services IT Projects	18,900	18,900	0
Enterprise Shared Services IT Projects	19,922	19,922	0
Security (Transferred from WTC)	0	0	0
Subtotal Capital Other Org.	48,072	48,072	0
Total Strategic IT Projects	\$162,942	\$111,346	(\$51,596)
General Equipment			
XM1 - Furniture, Partitions	2,022	2,022	0
XM2/13 - Vehicles	55,441	55,441	0
XM3 - Stores Equipment	818	818	0
XM4 - Shop Equipment	740	740	0
XM5/15 - Lab & Test Equipment	7,086	7,086	0
XM6 - Tools	7,137	7,137	0
XM7 - Miscellaneous (AC's, VCR's, etc.)	2,385	2,385	0
XM8 - Telecommunications	5,159	5,159	0
XM10 - Computers	18,276	18,276	0
Total XM's	\$99,064	\$99,064	\$0
Total CECONY Common Capital	\$ 314,309	\$ 262,713	\$ (51,596)

6. Budget Approval Processes

The bottom-up budget requests for several CECONY organizations come to a decision-point following presentations to and decision-making at the senior vice president level. Organizational budgets are presented to the senior vice presidents of electric operations, central operations, gas operations, customer operations, the two shared services organizations and the headquarters organizations, as coordinated by the controller's group. Each of these CECONY organizations has its own budget and planning coordinator, who prepares bottom-up budgets and presentations for the senior vice president to review. Generally, each CECONY organization adheres to the total capital and O&M guideline budgets determined by corporate accounting prior to the start of the budget process. The bottom-up budgets have been reviewed by various levels of management, and again by the senior vice presidents. These reviews sometimes result in a shifting of the budget dollars within the individual organizations. The budgets as approved by senior vice presidents then go to the corporate planning and analysis group for consolidation at the corporate level and presentation to the CECONY COO.

The COO reviews, discusses with the sponsoring executives, and approves the consolidated budget for CECONY. The COO generally does not reprioritize spending among the functional organizations or among the electric, gas, and steam units. Each organization's portion of the total budget is prioritized within the individual organization. Common projects are somewhat lower in prioritization to those of the electric, gas and steam businesses. The common projects may have implications across each of the commodity businesses, and include computer equipment, vehicles and other expenditures that the company considers to be more discretionary in nature.

The CEO reviews the individual operations requests in early September. The CEO, along with the President and CFO, then review the consolidated CECONY budget request in late September. The CEO then presents the preliminary consolidated CECONY budget request to the finance committee of the board in October. At this level, the budget request undergoes reviews necessary to determine if the total budget request is in line with other company financial measures and forecasts (such as return on equity and earnings per share levels and growth), or if there are any additional projects or programs that require increases above the budget guideline levels. Upon completion of this review process, the CECONY board approves the one-year capital and O&M budget for the subsequent year at its November meeting.

The budget materials presented to the finance committee of the board take the form of a summarizing PowerPoint presentation and three specific memorandums that set forth the proposed capital and operating budgets for the upcoming budget year. At the November 2007 finance committee meeting, the COO made a presentation to the committee on the 2008 budgets for CECONY, O&R, and the competitive energy businesses and on the consolidated CEI budgets. The controller then summarized the operating budget and capital presentations for CEI and CECONY, detailing the major financial assumptions used in establishing the budgets, and quantifying the major drivers to earnings. The controller also presented the variations from the estimated results for the year 2007 and the variation of the proposed 2008 budget compared to the earlier estimate for 2008 presented in January 2007. The controller finally presented the budgeted income, earnings per share, and capital program for 2008 along with the resulting cash flow statement and a financing plan for 2008.

The finance committee then approved resolutions recommending that the board approve the budgets included in the controller's memoranda to the committee for each of the capital and operating budgets. The capital budget memorandum included a summarized capital budget (presented in the table below) for 2008. The memorandum also included an attachment of the detailed 2008 capital budget request by previously authorized or currently requested project and program. This detailed budget included specific line items for annual routine capital programs, such as new business, electric burnouts and interferences. It showed each capital project and amount that had been previously authorized by the board, and the amount of requested amendments (generally project estimate increases) to the existing authorizations. The detailed capital budget also included new projects and ongoing programs proposed for authorization by the company. The detailed list of projects requested to be funded in 2008 was consistent with the simplified capital budget shown below.

CECONY YEAR 2008 CAPITAL BUDGET MEMORANDUM (NOV. 8, 2007)

	2008 Budget	2008 Forecast in Jan. '07	Increase (Decrease)
ELECTRIC			
Transmission & Switching Stations	\$239	\$165	\$74
Substations & Sub-transmission	628	441	187
Distribution			
New Business	144	117	27
Burnouts	98	197	(99)
Interference	31	25	6
Improvements & Reinforcements	553	274	279
Transformer & Network Protectors	144	94	50
Meter & Meter Devices	12	12	0
Total Distribution	<u>982</u>	<u>719</u>	<u>263</u>
TOTAL ELECTRIC	1,849	1,325	524
GAS			
Distribution	218	162	56
Supply Mains & Tunnel Facilities	<u>81</u>	<u>95</u>	<u>(14)</u>
TOTAL GAS	299	257	42
STEAM			
Production	87	82	5
Distribution	<u>28</u>	<u>22</u>	<u>6</u>
TOTAL STEAM	115	104	11
COMMON			
Buildings, Information Technologies and General Equipment Used by Electric, Gas and Steam	315	193	122
LOWER MANHATTAN RESTORATION	<u>18</u>	<u>32</u>	<u>(14)</u>
TOTAL	<u>\$2,596</u>	<u>\$1,911</u>	<u>\$685</u>

The full CECONY board of trustees, who were in attendance at the finance committee meeting, then discussed a third memorandum from the controller entitled "Consolidated Edison, Inc. Summary of Year 2008 Operating Budget and Capital Budget." A Board resolution then

approved the 2008 capital and operating budgets. The next table shows the approved 2008 operating budget, with later adjustments approved by the Board in April 2008 to conform to the Commission's rate case decision.

2008 O&M BUDGET

	2008 Original Budget	Total Reductions	Revised April 2008 O&M Budget
CECONY OPERATIONS			
Electric Operations	305,603	(16,504)	289,099
Customer Operations	172,097	(10,992)	161,105
Gas Operations	89,333	(981)	88,352
Central Operations	299,788	(4,979)	294,809
Environmental, Health & Safety	15,918	(388)	15,530
President	5,515	(400)	5,115
Sub total	888,254	(34,244)	854,010
Uncollectibles	53,000	-	53,000
Interference	115,324	(8,690)	106,634
Total O&M - Operations	1,056,577	(42,934)	1,013,643
Shared Services	162,451	(5,704)	156,747
Law	23,044	(496)	22,548
Finance	67,425	(3,335)	64,090
Public Affairs	34,923	(8,825)	26,098
O&R Support of Shared Services	5,782	(276)	5,506
General Auditor	6,640	(210)	6,430
Chairman & Staff	3,157	(719)	2,438

7. Financing Plans and Forecasts

The company prepares five-year forecasts, which include the approved one-year capital and operating budgets. The forecasts include the estimated capital expenditures for the full five year period, as well as projected increases in operating expenses. The forecasts include the amounts of additional revenue required for the company to earn its authorized return on equity in each the electric, gas, and steam businesses. Management presents the five-year information to the CECONY board at its January meeting. The forecast shows required external financing for CECONY; this information forms the basis of external financing plans also presented to the board at the January meeting.

CECONY has a target for equity capital of 48 to 50 percent of the utility capital structure. The target credit rating for the utility is "A." The utility five-year forecast for 2008-2012 included the issuance of debt securities of about \$2.25 billion in 2008, and about \$1.5 billion per year in 2009 and 2010. The forecasts showed equity capital injections from CEI in the range of \$530 million in 2008, \$630 million in 2009 and about \$500 million in 2010 as being required to maintain the target capital structure. CEI would issue its common stock to fund the equity injections. In April 2008, the utility issued \$600 million of ten-year debentures at a spread of 230 basis points over treasuries, and an additional \$600 million of 30-year debentures at a spread of 240 basis points over treasuries. The company notes that the interest-rate spreads over treasuries were at least 1 percent higher than normally experienced due to the tight credit markets in April, which worsened later in 2008.

The January board meetings for CEI and CECONY include additional presentations and approvals required to complete the budget approval process. The preliminary financial results for the recently completed year are first reviewed. The CFO then discusses his memorandum to the board that includes the capital expenditure forecast for five years. The forecasted capital expenditures for CECONY were \$11.931 Billion. The utility's five-year capital expenditure plan was \$2.80 Billion, or 31 percent higher than the previous year's forecast for 2007 through 2011. The memorandum included discussion of the primary areas of increase in the budget plan from the previous year's five-year plan. The forecast is provided for the information of the board, as only the first year of the forecasts requires board approval.

The five-year capital expenditure forecast is a fundamental component of the five-year financial forecast. The CFO also presents a memorandum that includes a five-year financial outlook to the board at the January meeting. The forecast is discussed with the board, and provides information for dividend and external financing decisions, both at CECONY and at CEI.

The CECONY treasurer presents two memoranda regarding external financing that provide information and recommendations for required resolutions of authorization. At the January 2008 board meeting, authorization was requested for CECONY to sell up to \$2.4 billion of debt securities to meet the new money needs of the utility and to repay maturing debt. This amount includes \$2.25 billion of external financing required in the utility forecast plus a \$150 million contingency. The treasurer also presents and discusses a memorandum requesting authorization for CEI to issue new common stock. The proceeds of common stock are to be used primarily to fund injections of equity capital into CECONY.

8. Budget Status Reporting

CECONY budget management reporting occurs in two different formats for specific audiences. Financial performance reporting is targeted for company executives, upper management and the CECONY board. The CARE system provides more detailed budget information for departmental managers, project managers and capital program managers. Both systems provide performance information as compared to the budget for both capital and O&M expenditures.

a. Monthly Financial Reports

Corporate accounting issues a monthly comprehensive report of CECONY financial performance to executives and management. The report provides monthly and year-to-date financial

performance for the utility businesses. Return on equity for each of the electric, gas and steam commodities is provided on a 12 months ended basis for the current month, the previous month and for the comparable period in the previous calendar year. Operating revenues, operating expenses and operating income are also provided for the current month, year-to-date, and the 12 months ended for each of the commodity businesses.

The monthly financial reports also include extensive budget performance information for operating expenses and capital expenditures. Actual operating expenses are compared to the budget and the previous year's actual expenditures for both the current month and for the year-to-date. The operating budget performance is provided for a number of corporate expenses such as pensions, health insurance, rents and other miscellaneous expenses that are not part of the operation's departmental budgets. The performance to budget for O&M expenses are also provided for each major organization and the major departments within each organization. The table below shows the departmental O&M reports. An analysis of the significant variations from budget in departmental expenses for both the current month and the year-to-date is provided to supplement the budget performance reports.

Departmental O&M Budget Report

	Month of April					Four Months Ended April 30				
	Actual 2008	Budget 2008	Actual 2007	Variance Budget 2007	2007	Actual 2008	Budget 2008	Actual 2007	Variance Budget 2007	2007
Operations										
President & Chief Operating Officer	(61)	110	80	(171)	(141)	196	1,455	320	(1,259)	(124)
Customer Operations										
Customer Operations	12,225	12,083	14,328	142	(2,103)	52,718	52,291	51,232	427	1,486
Uncollectibles	4,323	4,000	4,294	323	29	19,184	17,100	17,088	2,084	2,096
Theft of Service Billings	(863)	(773)	(1,352)	(90)	489	(2,791)	(2,949)	(3,786)	158	995
Total - Customer Operations	15,685	15,310	17,270	375	(1,585)	69,111	66,442	64,534	2,669	4,577
Environment, Health and Safety	1,072	1,144	1,006	(72)	66	4,320	4,655	4,157	(335)	163
Electric Operations										
Distribution Field Operations	21,405	17,756	22,747	3,649	(1,342)	73,325	72,158	67,830	1,167	5,495
Engineering Services	3,545	3,576	3,514	(31)	31	12,437	13,750	15,288	(1,313)	(2,851)
Energy Efficiency	425	426	337	(1)	88	1,314	1,421	1,215	(107)	99
Energy Services	771	852	807	(81)	(36)	3,057	3,331	2,990	(274)	67
Total - Electric Operations	26,146	22,610	27,405	3,536	(1,259)	90,133	90,660	87,323	(527)	2,810
Central Operations										
Senior Vice President & Staff	78	219	71	(141)	7	304	1,624	309	(1,320)	(5)
Central Engineering	(47)	461	838	(508)	(885)	442	2,710	2,082	(2,268)	(1,640)
Maintenance & Construction Services	549	593	622	(44)	(73)	2,314	2,431	2,288	(117)	26
System & Transmission Operations	3,998	4,380	3,849	(382)	149	16,635	15,858	14,411	777	2,224
Steam Operations	12,530	11,289	11,745	1,241	785	42,959	41,472	38,319	1,487	4,640
Substation Operations	6,761	7,605	8,661	(844)	(1,900)	28,413	28,932	29,794	(519)	(1,381)
Sub-Total - Central Operations	23,869	24,547	25,786	(678)	(1,917)	91,067	93,027	87,203	(1,960)	3,864
Interference	8,159	8,097	6,402	62	1,757	27,895	31,126	23,200	(3,231)	4,695
Total - Central Operations	32,028	32,644	32,188	(616)	(160)	118,962	124,153	110,403	(5,191)	8,559
Gas Operations										
Senior Vice President & Staff	665	500	439	165	226	2,022	1,991	1,709	31	313
Central Groups	1,429	1,502	1,628	(73)	(199)	5,273	5,401	5,291	(128)	(18)
Area Gas Operations	4,212	4,132	5,755	80	(1,543)	17,818	17,327	18,861	491	(1,043)
Engineering	366	440	265	(74)	101	1,387	2,032	1,058	(645)	329
Environment, Health and Safety	157	179	134	(22)	23	629	705	752	(76)	(123)
Gas Control	168	151	150	17	18	526	589	527	(63)	(1)
Emergency Response Center	241	268	262	(27)	(21)	1,004	1,106	962	(102)	42
New York Facilities	0	0	0	0	0	0	0	0	0	0
Total - Central Gas Operations	7,238	7,172	8,633	66	(1,395)	28,659	29,151	29,160	(492)	(501)
Total Operations	82,108	78,990	86,582	3,118	(4,474)	311,381	316,516	295,897	(5,135)	15,484
Business Shared Services										
Senior Vice President and Staff	81	79	39	2	42	235	229	163	6	72
Energy Management	-	-	-	0	0	-	-	-	0	0
Information Resources	3,552	3,475	3,966	77	(414)	14,150	14,254	14,481	(104)	(331)
Purchasing	629	638	570	(9)	59	2,359	2,564	2,378	(205)	(19)
Central Field Services	162	173	162	(11)	0	673	693	606	(20)	67
Total Business Shared Services	4,424	4,365	4,737	59	(313)	17,417	17,740	17,628	(323)	(211)
Enterprise Shared Services										
Senior Vice President and Staff	(41)	160	47	(201)	(88)	302	325	185	(23)	117
Energy Management	1,094	805	823	289	271	3,611	3,398	3,186	213	425
Services	42	46	49	(4)	(7)	174	224	65	(50)	109
Shared Services Administration	121	142	107	(21)	14	488	540	408	(52)	80
Human Resources	3,349	3,288	2,898	61	451	11,973	12,283	11,265	(310)	708
Facilities	1,330	2,229	583	(899)	747	5,352	5,158	2,872	194	2,480
Research & Development	1,108	420	1,760	688	(652)	4,401	5,835	3,473	(1,434)	928
Emergency Management	115	93	111	22	4	380	426	362	(46)	18
Security Services	265	243	175	22	90	986	999	666	(13)	320
EEO	67	74	69	(7)	(2)	231	289	244	(58)	(13)
Total Enterprise Shared Services	7,450	7,500	6,622	(50)	828	27,898	29,477	22,726	(1,579)	5,172
Law										
Law Department	1,597	1,610	1,549	(13)	48	6,181	6,508	5,891	(327)	290
Outside Legal Services	143	108	337	35	(194)	591	432	621	159	(30)
Secretary	95	172	85	(77)	10	602	520	506	82	96
Total Law	1,835	1,890	1,971	(55)	(136)	7,374	7,460	7,018	(86)	356
Finance										
Senior Vice President and Staff	207	194	427	13	(220)	1,015	1,317	1,207	(302)	(192)
Corporate Accounting	1,398	1,385	1,428	13	(30)	5,605	5,772	5,410	(167)	195
Treasury	290	528	593	(238)	(303)	1,982	2,744	2,297	(762)	(315)
Rate Engineering	346	323	316	23	30	1,360	1,374	1,271	(14)	89
Corporate Planning	90	191	8	(101)	82	449	910	206	(461)	243
Tax	318	255	201	63	117	939	1,087	795	(148)	144
Insurance Premiums	(3,292)	(2,888)	(3,094)	(404)	(198)	3,294	4,005	3,154	(711)	140
Total Finance	(643)	(12)	(121)	(631)	(522)	14,644	17,209	14,340	(2,565)	304
Public Affairs	1,671	1,548	3,900	123	(2,229)	8,221	8,545	7,831	(324)	390
O&R Support of Shared Services										
Energy Markets Policy Group	93	86	79	7	14	361	367	298	(6)	63
Regulatory Services	370	373	363	(3)	7	1,410	1,403	1,390	7	20
Total O&R Support of Shared Services	463	459	442	4	21	1,771	1,770	1,688	1	83
General Auditor	528	524	527	4	1	2,131	2,175	2,023	(44)	108
Chairman and Staff	271	124	161	147	110	733	932	667	(199)	66
Total Departmental Expenses	\$ 98,107	\$ 95,388	\$ 104,821	\$ 2,719	\$ (6,714)	\$ 391,570	\$ 401,824	\$ 369,818	\$ (10,254)	\$ 21,752

The monthly financial reports also include the capital budget status reports. Monthly and year-to-date capital budget performance is provided for each operating department, by major project category. For instance, electric distribution capital budget performance is reported by 12 expenditure categories. An analysis of the significant variances in the capital budget for the month and year-to-date is also provided.

The monthly financial reports also include key goals and performance indicators for the total company. The KPIs are provided on a total company basis.

CECONY also reports to its board budget results and variances on a monthly basis. Corporate accounting prepares a “Board book” for each month and quarter that provides a wide range of financial and operational information. Included in the board books are earnings variances as compared to the budget and the prior year. Capital expenditure levels are also compared versus previous years. The controller makes a monthly presentation to the board regarding budget performance. The company advises that more emphasis is placed on the quarterly board books and budget reports, which are more complete than the monthly updates. The board generally does not require more detailed or supporting information on budget performance or narrative explanations of budget variances.

b. CARE Management Reporting System

The CECONY management reporting system is called the CARE (cost analysis reporting environment) system. This system includes detailed information on budgets and actual performance for the capital and for the O&M budgets. The information in the CARE system is not part of the company's general ledger, but is a parallel database application updated nightly with general ledger information. Corporate accounting coordinates the reporting of monthly actual information and variance analyses. They have the responsibility to get variance explanations from managers and a detailed breakdown of the variances. The company attempts to mitigate budget variances as they are recognized with midmonth “look ahead” information on variances. The planning and analysis department prepares plans to remedy budget variances, and provides analyses of how the budget variances will impact the remainder of the budget year. Information and explanations for budget variances are also gathered from department managers.

The management reports are generally prepared by the organizational budget (finance) managers in each functional organization. The management reports are prepared for managers, general managers and vice presidents to manage budget performance in their respective operations. The management reports are significantly different between the major CECONY organizations, as well as within each of the organizations. While the management reports tend to focus on capital and O&M variances by function and department, the format and performance information provided are determined individually by the managers and vice presidents of each organization.

In electric operations, the management reports are reviewed and discussed in a monthly working meeting with the senior vice president, vice presidents, general managers and budget managers for all of the four electric operations regions. The electric operations regional reports include the following common information:

- O&M expense variance analysis - causes and explanations
- O&M expense variances by function (FCAT account)

- O&M expense variances by department
- Capital variance analysis -- causes and explanations
- Capital variances by function
- Human resources variances
- Overtime variances.

The management reports for Central operations are prepared for four departments: substation operations, system and transmission operations, construction, and Central engineering. The Central engineering reports focus on human resources and staffing, key performance indicators and labor dollars. The other three departments have some common elements in their budget reports:

- O&M expense variances in total, by function and by department
- O&M expense variance causes and explanations
- Capital variances by function
- Capital variance causes and explanations
- Overtime variance analysis
- Human resource variance analysis.

The management reports for steam operations have a different focus, due to the expanded responsibility of the steam department to include revenue and earnings. Steam operations prepares monthly reports to the Vice President and managers of steam operations. Included are analyses of operating revenue and operating income for the steam operations. The reports also include capital variances by function, O&M variances by department, and HR variances by department.

Gas operations also uses a unique management reporting format. Capital variances are reported by function. O&M and human resources variances are reported by department or region. CECONY measures capital and O&M productivity for each gas region. The productivity is measured by comparing actual hours, units, cost per unit, units per job and dollars expended against the budgeted amounts.

The CARE system can also be used to prepare special reports such as tracking the cumulative budget and spending of multi-year capital projects. For instance, the system can provide reports that show capital project month and year-to-date expenditures as compared to budget, as well as cumulative project appropriations and cumulative dollars spent.

c. Capital Reviews

The company has established a process to review and update the capital budget during the budget year. Capital projects and programs may require additional funding as a result of system events, failures or changes in project scope or costs. Some projects may be anticipated to run significantly over their budget, whereas others may be under budget or possibly cancelled or delayed. The review process has been established to re-allocate funding based on changes in capital plans and spending.

The two capital budget reviews occur in April and in late August or early September. The review process is coordinated by the planning and analysis group. Capital project and program changes

from the budget are discussed among the COO and senior management personnel that have capital budget responsibility. The discussions and process are an opportunity to move dollars between projects and organizations in order to meet the total companywide capital budget level. For instance, in 2007 this organization spent about \$170 million more than its capital budget. However, the delay in the permitting and schedule of a major transmission line project allowed a substantial amount of dollars to be removed from that project's budget for the year. The common capital budget of about \$300 million also tends to be lower priority items, some of which can be delayed to the next year. The second review is usually performed in conjunction with the submission of the next year's capital budget, allowing for any necessary project delays or slippage to be included in the budget process. The company also notes that if the total capital spending exceeds the approved budget by more than 5%, such budget overruns must be pre-approved by the CECONY board. The capital review process allows for the company to stay within its total capital budget by moving capital dollars between projects and organizations.

d. Audited Feedback Loops

Liberty reviewed and questioned the existence of audited feedback loops whose purpose is to improve the quality of information used in the company budgeting processes. Feedback loops should be in place to evaluate the quality of project analysis and cost estimate information to constantly improve decision information. The company should also perform evaluations of the effectiveness of past project prioritization efforts that could improve decision making. Regarding budget performance information, the company should have in place organized feedback loops that analyze management performance to budget levels.

The company noted that corporate instruction 291-1, requires auditing to perform a post-completion audit of all projects of \$2 million and over that have been approved on the basis of a favorable cost benefit analysis. Corporate instruction 610 -- 1 requires auditing to perform a post-completion audit of all projects of \$1 million or more with a claimed cost reduction of \$50,000 or more. Auditing has recommended that instruction 610-1 be changed to conform to 291-1. However, Liberty's review of Auditing's file of such projects from 2005 to present revealed that only one economically justified project had been reviewed during this period.

The company does have certain informational feedback processes in electric operations that are used to update the system models that identify electric loading and required relief. Central operations conducts quality assurance surveys and "lessons learned" reviews on selected capital projects to provide feedback information. However, Liberty did not find informational feedback loops related to project prioritization processes.

Many informal feedback loops exist within the company to analyze management performance to budget levels. As noted in descriptions of the company's management reporting processes, historical information from the previous year is an important component of determining budget levels, as well as measuring performance.

C. Conclusions

- 1. CECONY bottom-up processes for building O&M budgets within each of several organizations are generally well organized and effective.**

CECONY has a number of bottom-up budget processes for developing operating expense budgets throughout the company. The budget processes vary by organization and by the operations or functions performed by individual departments. The bottom-up budget processes are different for the three commodities: electric, gas, and steam. The budget processes are also different for field operating departments, as compared to engineering staff or corporate support staff.

Budget managers are included in the staff of each organization, and are responsible for planning, coordinating, assembling, and recording budget information. The budget managers define the methods to be used in preparing department or regional work plans and estimating the dollars required to execute the plan.

The O&M budgets in the electric, gas and steam operating departments and in central operations' substation and transmission departments are prioritized starting with the first level budgets prepared by field managers. Most of the remaining operating expense budgets are not prioritized, such as the central engineering, customer operations, shared services and headquarters support organization budgets. However, the allocation of the labor-oriented expenses in these organizations would not benefit significantly from the prioritization of expenditures.

CECONY consolidates O&M budget information at the senior vice president level to provide one consistent budget package for executive approval.

2. The CECONY top-down electric budget guidelines are currently based on requested rate levels as filed in rate proceedings.

CECONY describes its "normal" budget targeting process as determining the levels of capital and operating expenses that will allow the company to earn its allowed return on equity and maintain reasonable earnings per share growth of three to five percent annually. The reasonableness of the expenditure targets could be affirmed through preparing forecasts using the corporate financial forecasting model. However, such normalized budget targeting has not been used in the 2008 and 2009 budget processes.

The company has identified and planned for huge capital budgets and incremental operating expenses in 2008 and beyond, requiring significant annual rate increases in order to recover the increased expenditures and meet the financial goals. As a result, the CECONY budget guidelines for the 2008 and 2009 budgets have been the same as the expenditure levels requested in pending electric rate cases, and as settled in the gas rate case. The top-down spending targets as expressed in the company's budget guidelines are simply the amounts requested in rate filings. If the rate case test period is approximately the same as that of the budget year, the budget targets would be the same as requested rate levels. In addition, if the rate request is approved, spending at the levels in line with the budget guidelines should result in the company earning near its allowed return on equity, as well as meeting earnings per share growth goals.

3. Annual electric rate cases have supplanted the CECONY budgeting processes for the 2008 and 2009 budget years. (Recommendation 3)

The large increases in CECONY's capital and operating expenditures have caused electric rate increase requests for each of 2008 and 2009. The company has developed a rate case filing process whereby capital expenditures and incremental operating expenses for a future rate test period are solicited and compiled in an electric rate increase request. For the electric rate filing with a rate year beginning in April 2008, capital and incremental expenses were compiled and assembled as exhibits starting in late 2006 for a rate filing in May 2007. The company's budget process for 2008 was initiated with budget guidelines (targets) that were based on the same projects and spending levels that were included in the rate filing. The rate case became the company's guideline for the budget processes for 2008 and 2009. A similar rate case process preceded the 2009 budgeting processes.

An effective budget process requires that capital projects and operating expense programs be identified, analyzed, requested and budgeted in a structured process from the bottom-up. However, when the company has already requested projects, programs and spending levels in a rate case filing, the budgeting process becomes an operational formality rather than a rigorous testing of proposed expenditures. The testing of budget items occurs in the rate case forum, and the rate decision becomes the company's budget.

The substitution of a rigorous budget process with annual rate cases causes several problems for budgeting effectiveness:

- Budgeting processes and decisions are replaced by the "wish list" dynamic of a rate case request
- Decision-making on project, program and expenditure approvals is passed to the public service commission
- Rate case requests and decisions are usually not operationally or economically prioritized
- Company employees and management no longer have ownership of the budget process and projects.

4. CECONY executive management does not set long-term plans, goals and objectives for reliability and infrastructure investment that can be linked with the annual budget process. (Recommendation 1)

CECONY does not currently have an integrated, long-term electric vision or plan that sets forth "where the company is going" regarding infrastructure replacement and its effect on long-term electric reliability. The company's electric planning is fragmented and mostly short-term in duration. Goals for systematically replacing components of the company's aging infrastructure that will impact most favorably on long-term reliability have not been determined or their systematic implementation planned.

Formulating such a long-term electric plan is also extremely important for budgeting and rate proposal purposes. A long-term electric plan that has the support of the public service commission and other stakeholders provides the touchstone and roadmap for preparing the shorter-term plans required to reach infrastructure and reliability investment goals. The company's five-year capital forecasts, longer-term rate case filings and decisions, and each one-year budget are not currently designed to demonstrate significant and measurable progress toward meeting longer-term electric system objectives. These plans are not specifically linked to a long-term electric plan to ensure that progress toward long-term system goals and objectives is

being made, and that budgets and rate plans serve to support the systematic improvement of company infrastructure.

5. CECONY identifies and initiates expenditure projects and programs with appropriate and consistent system modeling.

The company identifies required expenditures and capital projects using system-specific modeling applications within each of several operational organizations. Consistent engineering requirements models are utilized to identify component loadings and the requirements of the electric and gas systems.

For example, the poly voltage load flow model (PVL) is used to determine loadings on electric system components and identify over-loadings. This model is used by each electric distribution region, distribution engineering and substation operations to identify system loadings. The use of the PVL model by a variety of engineering groups provides consistency in the identification of requirements on the company's electric system below the transmission level. An annual load relief plan is prepared using the results of the model to meet system requirements.

A second annual electric system model is the 10-year substation and sub-transmission feeder load relief program. This program provides a forward-looking 10-year loading capacity analysis of all area substations and associated supply feeders. The program identifies the timing, location and nature of reinforcements required over the next 10 years.

The company also uses a network reliability model and index to identify electric network reliability capital projects and programs. This model is a predictive tool that models all 60 of the CECONY electric distribution networks using a Monte Carlo simulation. The model is run annually and provides a relative ranking of the jeopardy of network failure. Based on the outcome of these analyses, options are developed for new and replacement facilities to improve network reliability.

Gas operations uses gas network analysis software to model the gas transmission and distribution systems. These models analyze system pressure and flows to evaluate the impact of planned work, to plan for future infrastructure reinforcements, to evaluate the effects of new system loads, and to prepare for emergency contingencies. Another key gas modeling effort is the gas mains replacement failure analysis model. This model predicts gas leaks and is used to build a main replacement plan. The model prioritizes replacement main sections by condition and risk.

Capital projects are consistently initiated throughout the company with a capital budget request form, and corporate instruction 610-1 provides structured approval procedures to be followed to achieve project authorization, appropriation and funding.

6. Capital projects and programs are analyzed and prioritized using different methods and processes in each major organization. (Recommendation 2)

CECONY analyzes and prioritizes potential capital projects and programs with a variety of methods and techniques, depending on the organization that initiates the capital expenditure request.

Electric operations identifies load relief requirements, some of which require capital investments. Analysis of the capital investments is focused on options for load relief. For instance, options for overloaded feeder cable could include replacing the older cable with higher capacity cable, splitting the load between feeders, installing new feeders or balancing load between feeders. The company's analysis in this instance focuses on the least cost option for load relief. Economic analysis of the options over asset life-cycles or a longer time horizon are generally not prepared.

Central operations analyzes alternatives for load relief of substations and transmission facilities. Since building a new substation to provide long-term load relief can cost more than \$200 million, load transfers, substation upgrades and other means of expanding capability are examined to delay the substation projects. CECONY would examine load relief options such as load transfers, demand-side management or distributed generation options on feeders or substations. The costs of such temporary measures are estimated and compared, along with the engineering advantages and disadvantages of each option. Each proposed solution to resolve a projected overload is evaluated based on the project cost, time required to construct, and the resulting impact on area and system reliability. Solutions that use operations or equipment modifications to resolve near-term overloads are generally the least expensive on a short-term expenditure basis and are selected, when available.

Electric operations prioritizes capital projects by simplified category, in the following order: safety, load relief, environmental, reliability, and strategic IT. These priority categories are used to rate capital program categories and projects as high, medium, or low priorities within the distribution regions. More than 90% of the 2008 distribution capital budget was considered a high priority. Central operations prioritizes its capital projects using its "17 attributes" criteria, which are significantly different from the electric operations criteria.

In gas operations, the gas planning vice president requires an evaluation of alternatives, as well as a short written justification for each proposed project. The gas operations senior vice president requires only a summarized one-page justification for capital projects. Gas operations also has their own specification for the prioritization of gas projects, which is used to rank the gas projects for budget purposes.

Certain common capital projects may be analyzed using the economic analysis of costs and benefits over the asset life or other long-term horizon. For instance, the AMR and AMI metering programs were included in the capital budget based on long-term economic analyses. However, this type of analysis is usually not performed for most common capital expenditures. The common capital budget is prioritized in meetings of executives from several organizations that are responsible for the common capital projects.

7. CECONY does not have a common, company-wide analysis system to evaluate and allocate projects based on their long-term economic value. (Recommendation 2)

As noted in the previous conclusion, CECONY performs various types of engineering analyses to identify and justify projects and program expenditures for the capital budget. Electric operations, central operations (including steam), gas operations and the common capital committee each have methods for analyzing and prioritizing projects and expenditures that are unique to their organization. The fact that CECONY does not have a common, company-wide

method of analysis makes the executive level allocation of limited capital dollars difficult. Since no common analysis has been applied, capital allocation decisions must be made based upon experience or the "gut" instincts of executives. The company needs a common analysis method and metrics to be able to compare the relative merits of projects and expenditures, to provide better capital expenditure information to the CECONY board, and to share the results with the public service commission and other stakeholders as justification for capital dollars expended.

The company also does not perform long-term economic analysis on its capital projects and programs, or on large incremental operating expense programs. Only a few examples of long-term economic analysis were observed at the company -- for AMR, AMI, and certain IT projects in the common capital budget. CECONY should analyze all of its capital expenditure projects and annual capital programs with long-term economic analysis that provides common value metrics. Such analysis and metrics demonstrate and compare the relative value of various projects or programs to the company and, in turn, its customers. It is important for the company to determine the "bang for the buck" that it generates for every type of capital expenditure, even for routine capital programs that are included in every annual budget. The economic value metrics of each type of program and each capital project proposed for the budget should be determined to provide decision-making information for executives.

8. Longer-term reliability and infrastructure projects can be "crowded out" of the capital budget by shorter-term priorities, or not proposed. (Recommendation 4)

The CECONY capital budget is not linked to a long-term infrastructure replacement program. As a result, infrastructure replacement investments are not regularly scheduled as a portion of the capital budget, and progress on long-term infrastructure replacement is not currently a priority. In addition, infrastructure or long-term reliability investments may not be proposed from the bottom-up due to the company's emphasis on shorter-term load relief investments, especially in the electric distribution organization.

Electric operations prioritizes its capital projects with safety projects as the first priority, load relief as the second priority, and reliability investments as the fourth priority. The high volume and spending committed to categories such as emergency responses, feeder and substation load relief, and expensive new programs such as work on the electric secondary system have required huge capital investments for the electric distribution system. The electric operations revised prioritization for the 2008 capital budget included about \$925 million of high-priority capital items and only about \$48 million and \$15 million of medium and lower priority items, respectively. One medium priority item that was included in the original capital budget was an investment of about \$50 million in network transformer replacements with loadings of greater than 100 percent and less than 115 percent. However, almost all of the originally proposed budget for these items was removed in favor of more spending on primary cable replacement, primary feeder relief, transformers with loading over 125 percent, and secondary open main investments.

The company notes that primary cable replacement and emergency response are always the top priorities in the distribution budget. The high priority category includes the items that are required to meet service obligations, and many that are mandated by the public service commission and other stakeholders. The company considers these first priority items to be

required or crucial to meeting service objectives. Medium priority items are for efficiency and reinforcement, such as the transformer replacements that were removed from the 2008 budget. Lower priority items tend to be enhancements to the system that are not immediately required. Investments in infrastructure replacement in electric distribution would be either in the medium or low priority categories. As noted above, very few dollars are devoted to these lower priority categories. We conclude that infrastructure replacement and longer-term reliability projects are not being systematically or regularly funded, especially in the electric operations budget.

9. The CECONY rate case filings and budget processes use consistent information that is verified by multiple company processes.

The company has processes in place to ensure that consistent information is used for rate case filings and in the budgeting process. For instance, capital expenditure information for an electric rate filing uses information from the company's five-year capital plan. For the electric rate filing in April 2008, the five-year capital forecast which was reviewed by the board in January 2008 was used as a base. The company is required to file five years of projected capital expenditure information for a rate case. The five-year capital forecast provides the rate test year information plus four additional years. This forecast capital plan is examined for any changes and new requested capital items. Verified capital information is provided to the public service commission staff in the rate case filing. The projects and expenditures are summarized as exhibits in the rate case filing.

Consistency between the rate case and the budget is also maintained by comparing the budget to projections for the rate case test period. New capital projects and programs are added to the existing prior-year base information. For instance, incremental projects and programs were first included in the 2008 rate case filing. The same information was included in the budget process that started three months later. The comparison of the rate case and budget is important, and the company demonstrates that is carefully checked.

Expenditures that are approved in the rate case are also tracked against actual expenditures by the company. The company reports that, starting with the 2005 electric rate case, quarterly and annual reports are made to the public service commission on actual spending, and are reviewed at regular meetings with the commission staff. This process was established as a requirement of the rate decision for the 2005 through 2007 rate period, and was also adopted in the 2008 electric rate order.

10. Budgets are effectively coordinated and consolidated using consistent formats and information at the corporate level for approval by the COO and CEO.

The executive management and board budget approval processes are well structured, coordinated and scheduled. The CECONY senior vice presidents have reviewed and approved budgets in several operating organizations in the early August timeframe. As we have noted previously, these bottom-up budgets differ significantly in the development methods used and the form of the informational presentations.

The senior vice president-level budget information is coordinated, made consistent, and consolidated by the planning and analysis department. Each of the major operational organizations hands off their budget to planning and analysis for consolidation at the corporate

level and presentation to the COO. The COO and CEO review the corporate budgets and make minor changes that they deem necessary. Projects and dollars requested are generally not changed or re-prioritized at the executive level if they meet the target budget guidelines.

11. CECONY effectively manages the external financing of funding requirements to support utility capital and operating spending.

CECONY's increasing capital budget is the primary driver for the company's need for substantial external financing in 2008 and for at least the next several years. The company's approved financial forecast for 2008 through 2012 identified the need for debt issuances of about \$2.25 billion in 2008, and about \$1.5 billion for each 2009 and 2010. The company would also require \$500-\$600 million of equity funding in each of these three years to maintain the company's target capital structure of 48 to 50 percent equity capital.

The board approved the issuance of debt of \$2.4 billion in 2008. The company issued \$1.2 billion of 10 and 30-year debentures in April 2008. However, the historic difficulties in the credit markets later in 2008 caused the company to delay additional issuances until capital markets improve. The company notes that CECONY has access to the debt markets even during periods of a severe credit crunch, although at significantly higher interest rate spreads than is normally experienced. Utilities with investment grade ratings have maintained access to long-term debt funding on a fairly consistent basis as investors have sought more safety in their debt investments. CECONY's credit rating was downgraded by Standard and Poors' (to A-) and Fitch (to BBB+) in 2008, primarily as a result of the March 2008 electric rate decision and the company's large capital budget, which will require significant external funding. The issuance of CECONY commercial paper with the company's medium-grade (A2/P2) commercial paper rating has been difficult during most of 2008, and the company has had to rely more on its bank lines of credit for operating liquidity.

Obtaining equity funding at reasonable prices has recently been more difficult for CEI and CECONY. The last issuance by CEI was in May 2007. The CEI stock price has not been favorable for equity issuances in 2008, falling at times to slightly above the book value of the stock. The company's CFO and financial staff have noted that CEI would be reluctant to issue common stock to fund CECONY equity requirements if the stock price was near or below its book value. CECONY's ability to access reasonably priced equity capital to fund its capital program is not assured, due to uncertain equity markets and the market's current dim view of CECONY's regulatory recovery of its huge capital program.

12. CECONY has also explored a variety of alternative financing vehicles during the past few years.

The company has discussed various types of hybrid securities with investment banks, but are concerned with the rating agencies' poor view of such securities. The company also considers mortgage bonds to be a less attractive option than debentures due to the high cost of mortgage recording taxes in the state and city. The company has also performed several analyses of the potential refinancing of floating rate debt on its tax exempt securities, as well as on the potential refinancing of its existing debentures and preferred stock with new issuances.

13. The board of trustees authorized almost \$6 billion in additional capital budget commitments in 2008 that includes huge amounts of cost estimate increases and future-year project commitments.

The CECONY board approved a one-year capital budget for the following year at their November 2007 meeting. The CECONY capital budget approved for 2008 spending totaled \$2.596 billion as shown in the table below. However, the board also approved a detailed capital budget that includes previous authorizations for multi-year projects, increases in the cost estimates of these projects, and new project authorizations that greatly exceed the budget year spending. The actual amount of new spending authorized in the 2008 CECONY capital budget was \$5.963 billion, as shown in the second column of the table below.

CECONY Year 2008 Capital Budget - Detailed

Project Costs Previously Authorized	Amendment Request	Project Costs	Estimated Expenditures to 9/30/2007	Amounted Funded for 2008
\$8,079,453	\$1,785,847 ¹ \$4,176,892 ²	\$14,042,192	\$2,660,626	\$2,596,000

Thousands of dollars

1 Cost Estimate Increases

2 New and Annual Projects Requested

Prior to the approval of the 2008 capital budget, the board had previously authorized over \$8 billion of projects that had not been completed, and in many cases were not even scheduled to start in 2008. The previous authorizations also include some categories that are contingent in nature or are “placeholders” for possible major expenditures. An example of this is \$423 million previously authorized for the “retirement and demolition of Waterside generating station and Kips Bay station, net retirement.” No expenditures were planned for 2008 on this capital item.

The capital budget request for 2008 includes a huge amount of cost increases for previously authorized projects of \$1.786 billion, or a 22 percent increase in the previously authorized amounts. A large portion of the increase was due to increases in the estimates of several authorized substation projects, some of which had their cost estimates increase by 100 percent or more. Liberty considers cost estimates for board authorizations that require such huge upward revisions to be a major impediment to good long-term planning, as well as a problem for informed decision-making by company executives and the CECONY board. In addition, better information is required for capital expenditure estimates made for SEC documents and for company “insiders” such as credit rating agencies, who rely upon the company's capital and financial forecasts to determine credit ratings.

The preceding table also includes \$4.177 billion dollars in new and annual project requests for the 2008 budget. This amount includes 2008 budget items for routine capital expenditures such as new business, interference and burnouts; some new capital projects to be completed in 2008; and authorization requests for multi-year or projects or projects that are not expected to be started in the near future. An example of this last category is a new 2008 authorization requested

for the installation of two 345 kV feeders from Mott Haven to East Queens to Gowanus. This major authorization request includes an estimated project cost of \$800 million. The CECONY board has been asked to authorize this project, even though its timing, and status and cost is considered uncertain by company engineers.

The discussion above shows that the additional capital commitments made by the CECONY board for 2008 was actually \$5.936 billion, bringing the total authorized project costs to \$14.042 billion. Of this total amount, \$2.596 billion was to be spent in 2008.

14. The company has effective management reporting processes in place for both executives and manager levels to track, monitor and manage expenditures. Budget variances are appropriately identified, evaluated and corrective action taken.

CECONY's management reporting occurs in two different formats for specific audiences. Financial performance reporting is targeted for company executives, upper management and the board. The CARE system provides more detailed budget information for departmental managers, project managers and capital program managers. Both systems provide performance information as compared to the budget for both capital and O&M expenditures.

The monthly financial reports include extensive budget performance information for operating expenses and capital expenditures. The performance to budget is provided for each departmental organization and for the major departments within each organization. Analysis of the significant variations from budget in departmental expenses is provided to supplement the budget performance reports. The monthly financial reports also include the capital budget status reports. Capital budget performance is provided for each operating department and by major project category and an analysis of significant variances is also provided. The monthly financial reports also include key goals and performance indicators on a total company basis.

The CARE management reporting system includes detailed information on budgets and actual performance for both the capital and O&M budgets. The information in the CARE system is verified as consistent with the company's general ledger by nightly updating with general ledger information. Corporate accounting coordinates the reporting of monthly actual information and variance analyses. They have the responsibility to get variance explanations from managers and a detailed breakdown of the variances. The company attempts to mitigate budget variances as they are recognized. The planning and analysis department prepares plans to remedy specific budget variances, and provides analyses of how the budget variances will impact the remainder of the budget year. Information and explanations for budget variances are also gathered from department managers.

The CARE non-executive management reports are generally performed by the organizational budget (finance) managers in each functional organization. The management reports are prepared for managers, general managers and vice presidents to manage budget performance in their respective operations.

15. The company's capital review processes during the budget year adjusts expenditures to track rate case decisions.

The company has established a process called “capital budget reviews” in April and August of the budget year to re-allocate funding based on changes in capital plans, priorities and spending. The company says that:

This process allows senior management to control spending, monitor project implementation, and modify the work plan based on a dynamic environment.

However, this statement does not tell the whole story of the purpose of the capital reviews. The capital budget reviews also allow the company to manage its budget to match rate case decisions, to mitigate budget over-runs, and to meet budget targets resulting in better earnings. Liberty emphasizes that none of these objectives is inappropriate for the company to pursue; rather, they should generally be considered proper management of the budget given CECONY’s regulatory environment. The caveats to this general conclusion are that CECONY should not cut projects or delay spending from the budget that have been authorized in a rate decision for that period.

CECONY’s actions resulting from the public service commission Order in the 2008 electric rate case demonstrates how the company closely manages the company to rate cases. The company notes that it revised the 2008 budget to align with the rate Order. The rate Order removed \$242 million from the electric and common capital spending in 2008, which the company then removed from its budget, as shown in the table below.

Capital Budget Reductions by Function

2008			
	Current Budget	Revised Forecast	Variation
Transmission & Switching Stations	\$239	\$203	(\$36)
Substations & Sub-Transmission	\$628	\$526	(\$102)
Distribution			
New Business	\$144	\$156	\$12
Burnouts	\$98	\$134	\$36
Interferences	\$31	\$31	\$0
Improvements/Reinforcements	\$553	\$471	(\$82)
Transformers/Network Protectors	\$144	\$126	(\$18)
Meters/Meter Devices	\$12	\$12	\$0
Total Distribution	\$ 982	\$ 930	\$ (52)
Total Electric	\$1,849	\$1,659	(\$190)
Total Gas	\$299	\$299	\$0
Total Steam	\$115	\$115	\$0
Common	\$315	\$263	(\$52)
Lower Manhattan	\$18	\$18	\$0
TOTAL CAPITAL EXPENDITURES	\$2,596	\$2,354	(\$242)

The company also reduced its 2008 CECONY O&M budget by \$62.5 million in response to the rate Order.

16. CECONY's capital re-allocations in response to budget over-runs can cause infrastructure and reliability projects to be cancelled or delayed without board of trustees consent. (Recommendation 5)

CECONY must get the approval of its board to exceed its approved total capital budget by more than five percent in a budget year. The company has stayed within the five percent limit in 2005, 2006, 2007 and 2008. However, the company significantly re-allocated its budget between operating organizations in 2006 and 2007 to allow for large budget over-runs in electric operations while capital expenditures were only \$10.6 million over budget for the year (for 2007), keeping the total company spending near budgeted levels. The CECONY COO noted that the increases in electric distribution spending were driven by the stray voltage incident (2004), the Long Island City outage (2006), a gas explosion incident, and a steam explosion incident (2007). Electric distribution had a large capital budget over-run in 2007 of about \$172 million. The key areas of increases above the budget were primary cable replacement (\$40 million), load relief (\$51 million), new business (\$47 million), and transformer purchases (\$40 million). The

company's senior executives re-allocated capital spending during 2007 so that the total CECONY capital budget was exceeded by only one-half of one percent.

Central operations spent about \$83 million less than its original budget in 2007. The M-29 transmission project was experiencing permitting delays, and its in-service date was slipped from 2009 to 2010, resulting in budget savings of about \$69 million in 2007. Spending in several common capital projects were reduced (AMR, HR payroll, and IT projects) for a net savings of \$11 million. The "lower Manhattan restoration/World Trade Center" was \$75 million below budgeted spending levels due to an "unbudgeted federal reimbursement" of \$75 million.

The means by which CECONY almost met its total company capital budget in 2007 show that the company recognized that it had a great deal of "slack" in its budget to offset departmental over-runs through a convenient project delay and a budget-offsetting \$75 million payment from the federal government. These "remedies" indicate poor budget performance by the company as well as lax budget oversight by the board. They also indicate the ease with which approved capital budget dollars may be shifted between departments and projects, resulting in major over-runs not being brought to the attention of the board.

The ability of CECONY to shift capital dollars among organizations and projects can cause distortions in budget performance and management. Increased capital expenditures of almost 20 percent in electric operations to respond to "incidents" in 2007 caused the company to look for other projects to delay, or even cancel. While external forces delayed the M-29 project and provided the \$75 million WTC budget credit that covered these over-runs in 2007, longer-term infrastructure and reliability projects are the most likely capital items to be pared in years when such convenient budget offsets are not present. The increase in the electric operations capital budget of 20 percent, as well as the budget changes of \$83 million in central operations and \$75 million related to the WTC project should have required board approval due to the magnitude of the changes. However, CECONY's requirement to receive *board approval of changes of more than 5 percent in the total company budget* allows major but offsetting budget changes to avoid the scrutiny of the board.

17. The company does not have informational feedback loops in place to evaluate the quality of project analysis and prioritization efforts. (Recommendation 6)

Liberty did not observe functioning feedback loops that have the purpose of improving project analysis or project prioritization information. The company has a corporate instruction in place requiring the post-completion auditing of projects over \$2 million that were justified with favorable cost benefit analysis. However, only one analysis of this type was performed over the past 3¾ years. One explanation for this lack of activity is that the company justifies very few projects using cost-benefit or economic criteria, as we have identified in conclusions six and seven. The recommended implementation of an economic analysis system at the company should greatly increase the number of post-completion audits that will be required by corporate instruction 291 - 1.

Liberty did not find any processes in place to review past project prioritization efforts to improve this process in the future.

D. Recommendations

1. Strongly link CECONY's long-term electric plan with annual budgets, rate plans and 5-year capital plans. (*Conclusion 4*)

The benefits of establishing a long-term electric plan with specific goals, objectives and targeted areas of infrastructure investment are established in the report chapter that addresses Planning. Liberty recommends that a strong linkage be developed between the new long-term plan and the company's rate case and budgeting processes.

The long-term electric plan must first have the consensus of the public service commission and other major stakeholders, of course. It must provide a touchstone and roadmap for preparing the medium-range and annual plans required to reach infrastructure and reliability investment goals. The company's five-year capital forecasts, longer-term rate case filings, and each one-year budget must be developed to demonstrate significant and measurable progress toward meeting longer-term electric system objectives. These plans must be linked to the long-term electric plan to ensure that required investments are made, and that budgets and rate plans serve to support the systematic improvement of company infrastructure.

For example, the five-year capital plan should be developed by the company with the recognition that it must demonstrate strong linkage to the long-term plan, with specific investments that show progress toward meeting the long-term investment objectives. This linkage and systematic progress toward the long-term goals should be demonstrated to the board in its review of the company's five-year capital plans in January of each year. The same information should be also shared with the public service commission. The five-year capital plans form the basis for rate plans, and must also demonstrate linkage to and progress toward the long-term objectives.

From an annual budgeting perspective, linkage to and progress toward the long-term investment goals and objectives should be clearly demonstrated to company executives and to the board prior to the approval of one-year capital budgets.

Each of the linkages described will help to ensure that the company stays on the path to an improved and refurbished electric system, as opposed to the shorter-term focus of the current planning and budgeting processes.

2. Establish consistent, company-wide economic value analysis methods and metrics for capital projects and programs. (*Conclusions 6 and 7*)

CECONY should analyze all of its capital expenditure projects and annual capital programs with long-term economic analysis that provides common value metrics. Such analysis and metrics demonstrate and compare the economic value of various projects or programs to the company and, in turn, its customers. It is important for the company to determine the "bang for the buck" that it generates for every type of capital expenditure, even for routine capital programs that are included in every annual budget. The company should be able to demonstrate the economic value of its individual capital projects and programs come as well as the relative economic value of different categories of investments.

The economic value metrics of each type of program and each capital project proposed for the budget should be determined to provide prioritization and decision-making information for both managers and executives. Comparable economic value metrics of expenditure types and programs would also provide information for the board, the public service commission and other stakeholders that show the economic value of expenditures, and why the company's selected investments create economic value that accrues to customers.

The company should adopt an analysis method and metrics that consider the investment and the benefits and costs of the project over a long time horizon such as the asset life, or at least 10 years. Benefits and costs should be discounted at a cost of capital to determine their present value. Several forms of long-term economic analysis have been used in the utility industries for many years; a few of them include the present value of revenue requirements analysis, internal rates of return, discounted cost benefit analysis, and discounted benefit/cost ratios. While the company should determine the analysis technique and metrics to be used for their corporate analysis program, the technique should include:

- Longer term analysis horizons
- Present value analysis
- Comparison of benefits and costs in a simple and easily comparable format
- Ratios of economic value created to investment cost.

Liberty observed the usage of economic analysis techniques on some common capital and IT items. Similar analysis methods should be applied to all proposed capital projects and programs over a minimum dollar level such as \$1 million.

Common, company-wide analysis methods and metrics can also provide important information regarding the relative value of expenditure categories. For instance, questions such as: "What are the relative economic values of a dollar spent on paper cable replacement, versus the stray voltage safety program, versus a transmission line, versus vehicle fleet investments?" could be answered. Knowing the relative economic value of projects and programs provides an important additional piece of decision-making information when executives determine how dollars will be allocated. Such information would also be valuable for the company to share and discuss with the public service commission to promote a common understanding of what the company is "buying" with its expenditure dollars, as well as the relative "bang for the buck" of projects and programs.

Another use of common economic analysis can be measuring the changing value of programs over time. For a five-year safety program, the question may be asked "what is the value of dollars spent in the first year versus the third year versus the fifth year?" This type of information is helpful in determining how long such programs should be in place; the information should be shared with the public service commission to demonstrate the optimal length of such programs.

3. Work toward the re-establishment of multi-year electric rate cases. (Conclusion 3)

The processes for the 2008 and 2009 electric rate cases and budgets have caused the company's budgeting to lose its rigor as it merely mimics the rate proceeding. This unintended consequence of one-year rate cases with forecasted test periods must be recognized and changed to make the budget processes more meaningful and effective.

Liberty recommends that the company work collaboratively with the public service commission staff in proposing a three or four year forecasted rate period for electric rate cases. The adoption of a longer-term rate plan, however, is highly dependent on the quality of the forecasted rate case information. The rate filing must demonstrate linkage to a long-term electric plan and provide additional analysis and justification information for capital projects, programs and major operating expenditures that proves the economic value to customers of the proposed incremental expenditures. This recommendation is closely related to recommendations one and two above as part of a package to improve the company's long-term investment planning, expenditure analysis and economic value proposition, and rate recovery of value-creating expenditures.

The key to improvement in this area is an increased confidence of the public service commission that CECONY's proposed rate case projects and incremental expenditures:

- Demonstratively show systematic progress toward achieving the necessary investments and reliability goals and objectives of the cornerstone long-term electric plan
- Demonstrate the value proposition of each expenditure project and program so that stakeholders are convinced that rate case expenditures provide long-term economic value to the company and its customers.
- Provide confidence that projects will be budgeted, implemented and dollars expended as approved in rate cases, with regular reviews and open discussion of any changes to the rate plan.

4. Prioritize CECONY capital projects and allocate funding using long-term economic analysis metrics as a significant decision factor. (Conclusion 8)

The company's use of a variety of project prioritization methods among its different organizations causes a lack of comparable information to make capital allocation decisions at the executive level. Liberty recommends that long-term economic value metrics, as described in Recommendation 2, be used as a factor in the prioritization of projects within CECONY organizations, as well as at the executive level. The use of a common analysis tool and metrics will provide consistent evaluations on a company-wide basis, and may be used to allocate limited capital dollars. Its use may also cause certain high-value projects that have previously been cut from the budget to be approved and funded. Within the individual CECONY organizations, long term economic metrics should provide additional information for prioritizing projects and programs from the bottom up.

Liberty noted that few infrastructure replacement and longer-term reliability projects have been approved in electric operations. This organization's focus and priority ranking emphasizes safety and load relief projects; some reliability and infrastructure investments are not funded with the limited capital dollars allocated from the top down. The use of longer-term economic analysis will identify reliability and infrastructure projects that have very high economic values due to their long-term effect on reliability, and should be approved and funded. The most valuable of these longer-term investment projects should be identified in the annual capital budgeting process, and their approval should be consistent with the long-term electric plan.

5. Require changes in capital projects and programs (with a total cost of greater than \$10 million or and/or an annual budget of greater than \$5 million) of more than 20 percent from the annual budget to be approved by the board of trustees. (Conclusion 16)

Conclusion 16 described how CECONY shifted capital dollars among organizations to "cover" a 2007 capital budget overrun of \$172 million, or about 20 percent, in electric operations. The percentage increases for individual capital line items were actually much larger for programs such as primary cable replacement, load relief, new business and transformer purchases. The company's ability to offset such large increases above the budget with offsetting decreases, delays and even project cancellations does not constitute appropriate budget oversight by the CECONY board. In the example given, the company was not required to get budget increase approvals from the board because the net company increase did not exceed 5 percent.

Liberty believes that major changes in budget line items should be flagged and require approval by the CECONY board. The intent of the 5 percent limit is to notify the board of significant changes in their budget authorizations. However, in practice the company is able to avoid such notifications by orchestrating offsetting budget increases and decreases. This does not constitute effective oversight of budget performance. Such actions could also cause delays or even cancellations of board-authorized projects that could be important to long-term reliability or infrastructure replacement.

Requiring board approval for changes (both increases and decreases) in individual spending on authorized, major-dollar capital projects and programs of more than 20 percent will flag and provide notice to the board of substantial budget changes. Liberty chose 20 percent as the variance threshold to require board approval and draw attention to the most substantial capital budget variances. The spending variance on an individual project or line item in a single budget year may vary by more than 10 percent due to timing, permits, or a simple change in the number of routine occurrences such as burnouts. A 20 percent threshold would require a much larger variance to require board approval, which we believe should be reserved for the most significant variances.

6. Establish formal informational feedback loops for project analysis and project prioritization. (Conclusion 17)

CECONY should establish a functioning evaluation and feedback process for completed capital projects. The feedback loop would compare the assumptions and quantitative estimates that were used to justify the project with actual results. A formal feedback loop of this type has two objectives: a) to improve information and assumptions used in project analysis through "lessons learned," and b) to provide accountability regarding the information used to justify projects. A second and similar feedback loop should be established on annual capital budget prioritizations to provide immediate feedback and to improve the capital allocation decisions.

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XII. Work Management

Liberty has evaluated all elements of work management associated with the major physical work conducted by the Company with a particular emphasis on cost and effectiveness. We have divided the evaluation into four sections:

- A. Cost management
- B. Work planning
- C. Resource management
- D. Performance measurement.

The business units studied were:

- Electric Operations
- Gas Operations
- Steam Operations
- Construction

Substation Operations, System and Transmission Operations, and Public Improvement were reviewed to a lesser extent.

Our research has included 181 data requests, 58 interviews, and 7 field trips. For the data requests, the information covers the last five years, if available. For the interviews, we held discussions with personnel within various business units, ranging from the vice presidents, general managers, section managers, planners to supervisors. We also talked to the subject matter experts on specific topics. For the field trips, we spent the whole day observing the work crews from Electric, Gas, Steam, and Construction covering different regions in the Con Edison service territories.

Overall, our evaluation concludes that Con Edison is doing many things well in work management. Although a new and integrated work management system in Electric Operations is a critical need, there are good (but fragmented) tools and mechanisms available, especially relating to cost and productivity measurement. We further believe that implementation of an expanded view of cost management, which we term holistic cost management, will pay major dividends and elevate an already-strong organization to best-in-class.

With respect to work planning, the Company generally earns high marks. The lack of an integrated work management system in Electric Operations, as discussed earlier in this report, is a major handicap. Nevertheless, the processes employed to define work and assign it to the field are good and represent a strong foundation for the later steps of the work management process. While the cost elements of the work plans are generally good, there is a weakness in the degree of subsequent performance analysis against the cost plans and how deviations are managed.

There are numerous opportunities for improvement based on our analysis of resource management. Resource planning, particularly as it applies to long-term skill needs and changing work load, is a weakness, and further attention in this area can pay dividends. Management of overtime also is a weakness. Trends in this area are not good and the lack of appropriate response is a problem.

Any review of work management would be remiss if it failed to note that Con Edison suffered three fatalities in 2008, two of which involved separate electric incidents. Needless to say, this represents a failure of significant proportion and should call the Company's efforts in preventing such tragedies into question. The Company claims to have a "safety culture," and we saw evidence of a strong program and a real management commitment. In particular, the Company's Environment and Safety Committee is active and effective. However, there are other indicators that raise concerns. We are left with the contradiction of an apparently strong program with suitable executive support that has nonetheless produced an unacceptable result for 2008.

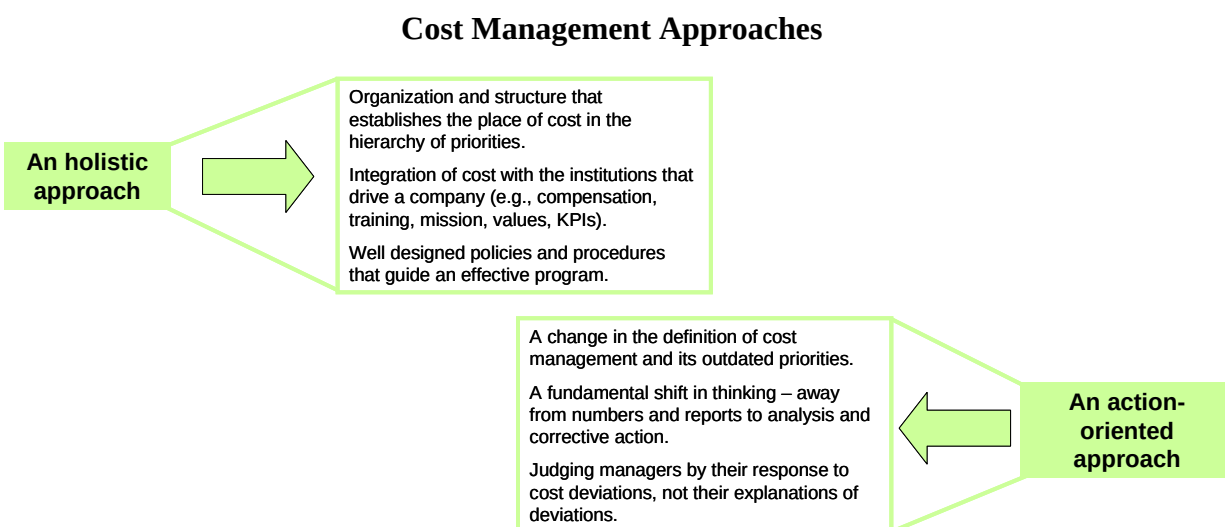
Measures of performance relating to physical work are particularly strong at Con Edison. There is an especially impressive catalog of productivity measures, including integration of the work breakdown structure, person-hours and physical quantities installed. The multiple levels at which such data are available sets the stage for what could be a very effective analytical capability.

On the negative side, the measures are revealing some potentially bad news. Productivity trends have not been good and Con Edison's targets are not aggressive. Quality trends are also weak in Electric Operations.

A. Cost Management

1. Background

During the audit process, Liberty approached Con Edison with a fundamentally different option for cost management, one which we termed "a holistic approach to effective cost management". Firms choosing this option shift their thinking at the policy level, establishing cost as a priority, designing an organization and structure to further cost effectiveness and integrating cost into the other management systems of the Company. A shift in thinking will also occur at the implementing level as the organization moves away from a narrow focus on numbers and reports to an expanded vision of analysis and action.



Con Edison management responded positively to this initiative and has already taken aggressive steps to make it a reality. A team of managers, headed at the executive level, is in place and advancing the holistic approach at this time. As a result, we have provided a minimal number of formal recommendations here in the recognition that the Company, if committed to the holistic approach, will find and implement the best solutions. We have provided recommendations on the essential components of the holistic approach and then simply provided suggestions and options that Con Edison's team may wish to consider as they build their program.

The holistic approach may be viewed by some as a change in the definition of cost management. For example, the dictionary offers no definition of cost management but refers us to "cost accounting". Others say "cost management is the process whereby companies use cost accounting to report or control the various costs of doing business." Neither portrayal comes close to our definition of cost management:

A process whereby professionals, knowledgeable in both the work being performed and cost-related skills, analyze the anticipated and actual execution of the work so as to proactively improve efficiency with the ultimate objective of optimizing expenditures.

The criteria by which Liberty evaluated cost management included the following:

- The relative "place for cost" in the hierarchy of priorities (for example, with safety, quality, schedule, etc.) should be clearly defined so as to be understood by all employees.
- Costs should be collected consistent with the WBS and be structured to facilitate analysis.
- Reports on workforce performance should relate costs to production and achievement of other job objectives, Credible analysis should be included in all management reports, and that analysis should include corrective action recommendations for cost deviations.
- A management process should be in place that forces response to cost deviations.

2. Findings

a. Cost Management in the Corporate Hierarchy

We judge the priority of cost management in a utility by its words and its actions. Clear statements and policies by management will indicate where cost management resides in the hierarchy of priorities. More importantly, management's actions, in terms of resources assigned, performance measures, ties to compensation, response to issues and other demonstrations of support, will send the more effective message throughout the Company.

A minority of companies specifically calls out cost management as a corporate priority. Other directly or indirectly related phrases, such as effectiveness, efficiency, budget, competitively priced, earnings and return, appear instead.



This is the case at Con Edison, as seen in its corporate pyramid that defines the six levels of strategic alignment:

- 1) Mission – “Provide energy services to our customers safely, reliably, efficiently, and in an environmentally sound manner; to provide a workplace that allows employees to realize their full potential; to provide a fair return to our investors; and to improve the quality of life in the communities we serve.”
- 2) Corporate Levels – Service, Honesty, Concern, Courtesy, Excellence, Teamwork
- 3) The Way We Work – Six principles: Plan the Work and Work the Plan; Seek and Accept Responsibility; Communicate Openly; Work in Teams; Improve Continuously; Celebrate Success
- 4) Strategic Objectives: (a) Strengthen the Core – Provide Reliable Service at Reasonable Costs; Be Responsible Stewards of the Environment; Enhance External Relationships; Strengthen the Company’s Support Activities; Strengthen the Company’s Human Resources. (b) Expand the Core – Build on Successes at the Competitive Energy Business; Grow through Regulated Expansion
- 5) Goals & Key Performance Indicators – Net income, Budget, Safety, Environment, Reliability, Employee development, Customer satisfaction, Emergency operations response, Regulatory compliance
- 6) Individual Contribution – All employees play an important role in contributing to the achievement of corporate strategic objectives.

The pyramid indicates that it is indeed management’s intention that cost, as listed in its various related forms, be an integral part of the hierarchy. At the corporate level, there are KPIs for net income and budget, again a recognition that cost management is a priority.

Our examination of cost as a priority did not progress, however, as we moved through the organization. As in many firms, cost management at Con Edison is not a structured program or discipline but presumed to be an ongoing responsibility of managers, with the further assumption that the requisite skills and capabilities are inbred into all managers. Since this tendency is prevalent in the utility and other industries, it is difficult to be too critical of Con Edison or anyone else. Suffice it to say that there is a great opportunity for enhanced cost management if one can get past these restraining beliefs.

b. Con Edison’s Cost Program

While Con Edison has no documented, structured program, it nonetheless is very active in cost management activities, some of which are quite impressive. We discuss elsewhere the effective cost collection systems, the excellent array of productivity measures and the integration of cost data. Further, there have been real improvements in cost activities associated with some capital projects, including an elevated capability for cost estimating.

In defining Con Edison’s de facto program, and its basic approach to cost management, we will draw a distinction between programs oriented to the collection, monitoring and reporting of costs and those oriented to the analysis and management of costs. This orientation is the key influencer of effective cost management, yet it is a distinction that is unknown in many organizations. The former approach is:

- Accounting oriented
- Focused on historical performance
- Conducted at arm's length from the work
- Has an end product of numbers and reports,

It is easy to see that financial people will have the skills and capabilities for these tasks and that their function is largely one of oversight. Their key deliverable is information – for the accounting system and its financial needs and for managers to fulfill their cost management responsibilities.

The alternate approach, and the one encouraged in holistic cost management, takes a different view of the challenge. It can be characterized as:

- Technically oriented
- Proactive, and focused on future costs
- Conducted by participants within the work process
- Has an end product of action to produce cost benefits.

This latter approach looks like, and indeed is, a different discipline altogether. The focus of the work, the deliverables, the motivation, the skills and tools required and management's expectations are all quite different. It should also be obvious that the second approach does not replace the first, which is needed to serve many essential needs.

<u>Oversight is generally:</u>		<u>Control is generally:</u>
After the fact	↔	In process – real time
Reactive	↔	Proactive – anticipatory
Reporting	↔	Managing
Arms length	↔	Participative
Focus on numbers	↔	Focus on analysis

The second approach is a key element of holistic cost management, and defines the effort as action-oriented and results-driven.

Con Edison's current program, like most utilities, is heavily weighted towards the first approach. This is evidenced by a number of observations:

- Management reports contain little in the way of analysis or recommendations for corrective actions
- Discussion of cost variances focuses on the results but rarely seeks root causes
- Productivity measures are plentiful, but they are not used to improve performance
- Tools focus almost exclusively on budgets
- All cost support functions are titled "financial" or "administrative" and are generally staffed by financial personnel

Based on these observations, there is a real opportunity for significant cost benefits by bringing in elements of the second approach.

c. Skills and Capabilities

Liberty has generally given high marks to Con Edison's organizational capabilities in costs. A shift to the holistic approach will not seek to change much in terms of the people and tools

available. Rather, a shift in application of resources and the use of tools and systems will be in order. In addition, some skills could be added to expand organizational capabilities.

In our recommended approaches, support personnel play a critical role in stimulating management action. Their analyses have to be accurate, insightful, reasonable and convincing, with the degree they motivate management to corrective action be the ultimate success criteria. The cost support personnel must therefore have a strong understanding of the work being measured and must be able to detect problems, understand root causes and propose solutions. In order to do this, they must also have strong cost-skills including the ability to accurately translate the data into real conclusions and actions.

This discussion correctly suggests that the cost support personnel must be close to the working group and its management. In fact, we see these personnel as serving the work group manager directly and being close enough to the physical work to understand it, analyze it and have credibility with those responsible for the work.

With respect to systems, their application becomes the new focus. Data outputs and reports should not be an end in themselves, but rather a means to a greater end – improved results. The notion that a cost report is a legitimate deliverable in its own right should be rejected and replaced with the delivery of insightful analysis, effective recommendations and plans for improved results.

3. Conclusions

1. Con Edison management has defined cost management as an important part of its corporate strategy, but the formal supporting structure and program are not in place to allow that priority to play out in day-to-day operations. (Recommendations 1, 4)

The Con Edison corporate pyramid lays out the six levels of strategic alignment, and cost management is indirectly prominent. In the absence of a documented, structured program, however, this message does not survive to the working level. Line managers and work groups do not have the same feel for the priority of cost management in general and management's expectations in particular.

2. The cost collection systems and tools are comprehensive and accurate.

The current cost monitoring tools and systems collect relevant and accurate information for the current budget management needs. The Data Accuracy Reporting System (DARSY) ensures correct charges. The Impromptu reports provide managers with the necessary details to manage their jobs.

3. Workforce management reports have many charts and tables, but contain little in the way of analysis or recommendations for dealing with cost variances (Recommendation 1)

The existing tools focus on budget adherence. Cost analysis usually gives explanations of what account the variance occurred, but seldom seeks the root causes or provides recommendations on what corrective actions are required or how to mitigate similar situations in the future.

Productivity can be measured down to the individual level, but there is no continuous effort on using these measurements to improve performance.

4. Con Edison's approach to cost management is similar to other utilities in that it is accounting oriented and focused on monitoring and oversight.

There are many motives for collecting cost information, and some are mandatory, either to meet regulatory or other standards or to fulfill basic responsibilities of the business. It is therefore wrong to suggest that Liberty is critical of those efforts that we characterize as monitoring and oversight. We believe that those activities are necessary but insufficient to fully meet the demands of effective cost management. The set of activities that moves beyond oversight to real management and control are not given suitable attention in the organization.

5. Con Edison's cost support groups are capable at fulfilling the requirements and expectations of the current cost management approach. (Recommendations 2, 3, 4)

Con Edison has capable people in the cost functions and has demonstrated the capability to implement strong cost collection and monitoring tools. These capabilities suggest that the organization can evolve to an expanded view of cost as suggested under holistic cost management.

6. Con Edison can achieve substantial cost benefits by a shift to a formal program of cost management featuring a structure that places a high priority on effective cost management and an action-oriented emphasis on analysis and corrective action. (Recommendations#1, 4)

A strong foundation is already in place at Con Edison, in terms of people, systems, priorities and motivation. Adding the ingredients recommended here to an enhanced cost management program has the potential to elevate an already capable organization to best-in-class and, more importantly, produce tangible savings for the benefit of customers.

4. Recommendations

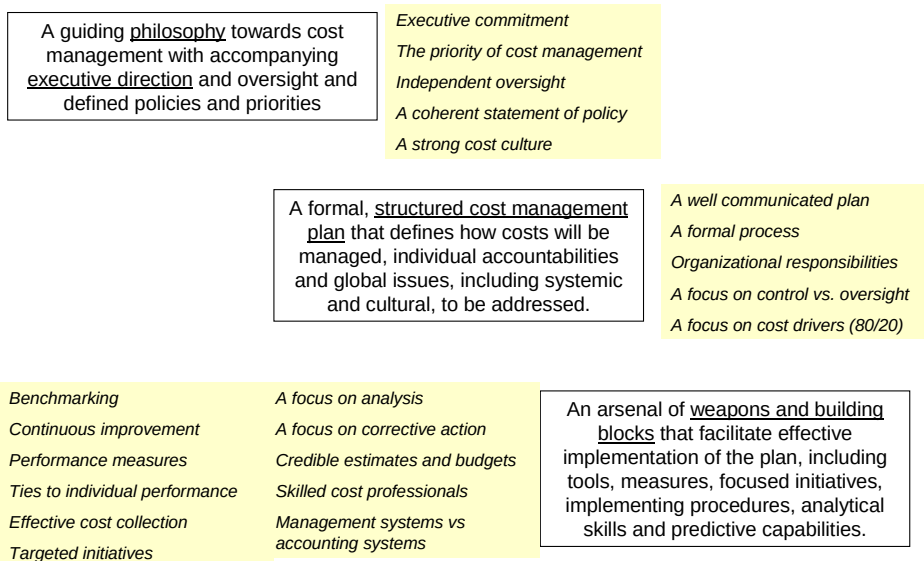
1. Implement a holistic approach to cost management that is designed and built around three key elements: (a) a guiding philosophy; (b) a formal, structured cost management plan; and (c) building blocks of comprehensive supporting capabilities (Conclusions 1, 3, 6)

Our recommendation for a holistic approach to cost management begins at the executive level, where management sets a foundation with clear direction. This direction communicates a guiding philosophy on how cost management fits in the Company's mission and strategy. It also establishes where cost falls in the hierarchy of priorities. In most companies, this will not be at the top, yet it is important for employees to understand how it does rate. Ignoring the question reduces effectiveness and makes the challenge of balancing cost against other priorities that much harder for managers.

The guiding philosophy will provide direction on management's expectations. It will define policies and priorities for employees. It will also put in place appropriate oversight mechanisms

to assure executive management that the philosophy and its accompanying policies are being aggressively implemented.

A Holistic Approach



The second key element of design is a formal, structured cost management plan, or set of plans. Such plans define how an organization will carry out the cost management function. It will define how costs will be managed, the organizational approach to be used, accountabilities, and any specific issues, including systemic or cultural cost issues that must be addressed.

The presumption that cost management is a naturally acquired skill inbred to all managers is wrong. The plan helps educate managers and support personnel on the actions expected of them and how the cost management system is intended to work. It will not be a general document, and the plan for one organization is unlikely to serve another.

The final element is the set of tools to be used in implementing the program. These are the building blocks that bring the philosophy and plan to life. They include the cost tools and reports that organizations traditionally use; but these tools are simply incidental contributors. They neither comprise the whole program nor define it, but rather join with the other building blocks to deliver the desired outcomes. Other blocks include the skills and capabilities of cost professionals, predictive capabilities, implementing procedures, focused initiatives directed at specific cost issues and the many other activities and capabilities necessary for effective cost management.

Con Edison management believes there is much to gain from this holistic approach and has embraced the process. Implementation is already underway.

Benefit: A shift in focus towards an action-oriented approach and the ensuing cost culture it generates will save millions of dollars per year.

Cost: The cost of moving to this new program will be dependent on the various elements chosen to populate the program. The basic foundation will not be expensive, as it entails establishing

and communicating a management philosophy and reassigning existing personnel. Significant costs will be experienced in adding new skills to field cost support and providing training for both managers and support people. We believe such costs will be under \$1 million per year. To the extent that more costly elements are added to the program, they should individually be justified on a cost benefit basis.

2. As skilled people represent the cornerstone of the holistic approach, expand the role of cost management professionals to encompass tasks and accountabilities important to holistic cost management. (Conclusion 5)

We have discussed how an effective organization moves beyond numbers and reports to meaningful analysis and corrective action. Only people can make that translation of numbers to action, so people become the all-important, not-so-secret ingredient.

We recommend that the cost professionals' role include the following:

- Direct support to work group management, helping and encouraging management to carry out their cost management responsibilities
- Preparation of analyses that directly lead to recommended corrective measures
- Assuring that the case for cost is heard in balancing priorities
- A focus on predictive methods and techniques, early identification of cost threats and elevation of cost issues while mitigation is still an option
- Development and implementation of supporting tools and processes.

The requisite skills need to be developed in the cost staff consistent with these new demands. Also, it is expected that the cost professionals will need to become more familiar with the details of the physical work. With time, such development efforts and integration of new skills will produce the staff of cost professionals required for the holistic approach.

3. Establish a cost support organization that is (a) placed consistent with the priority of cost management; (b) serves the cost management needs of all levels of management; (c) develops a force of skilled cost professionals and assures those skills are continuously improved; and (d) has overall accountability for the development and implementation of the cost management program. (Conclusion 5)

Organizational decisions by necessity must be carefully tailored to the particular traits of each Company. We therefore avoid offering any prescriptive recommendations on how to structure an organization. We can offer our thoughts on what has worked best for us in the past, but a final design needs to be based on Con Edison's circumstances, culture and people. Accordingly, the team in place to implement the holistic approach is best qualified to make that recommendation.

Our most successful cost organizations have featured a high reporting level, which immediately establishes the importance of cost and the credibility of the people. It is our understanding that Con Edison has already made this decision and the placement of the cost organization will leave no doubt as to its standing as a corporate priority.

We have also seen great success in using a matrix approach. A matrix approach is often dictated when a specialized skill is needed in a local organization but will be difficult to acquire, nurture

and retain in that organization. This is indeed the case of the cost professionals we envision. They are needed at the local level, and should report to the local manager. They could have a “dotted line” relationship back to the central cost management organization, which would be their real “home”. That organization would be responsible for their technical direction, supporting them with staff capabilities and providing training and career development.

The notion of a career path in cost management can be a valuable contributor to attracting and growing a strong cast of skilled cost professionals.

4. Provide training for managers, supervisors and cost support personnel in cost management techniques consistent with the holistic approach. (*Conclusions 1, 5, 6*)

Managers are rarely supported with training in cost management. They are left to their own devices with the result that some succeed and some do not, but all struggle unnecessarily. Training is especially important in the holistic approach since expectations for managers and support personnel are much greater than they are in traditional approaches.

Training is also essential to permit managers to make rational decisions on their information needs. For example, in developing Con Edison’s new work management system, the needs of managers must be a critical input. But in the absence of adequate training, we suspect that managers are not really able to effectively define such needs. Cost management training should therefore be considered a prerequisite to that new system’s development.

5. General Recommendation Implementation Guidance

Liberty believes that Con Edison’s commitment to the holistic approach will lead it to many new tools and initiatives. Accordingly, further detailed recommendations are not appropriate. Nevertheless, there are many techniques that have worked well elsewhere, and their consideration may benefit the implementation team. We therefore suggest that the team consider if and how any of these might help their efforts. Liberty recognizes that many of these suggestions may or may not be right for Con Edison, or may be right for only certain Con Edison organizations. In any event, the implementation team is best able to make such decisions within the framework of the holistic approach.

Cost management plans: Define a major project or program for which to prepare a test cost management plan. This could then serve as an example for others. Some specific elements of the plan might be:

- (a) Break the cost structure down into major cost elements or packages (perhaps 25-50) and then grade each for its “manageability”. Grading is a function of the amount of money in play, the variability of the element and management’s ability to influence the outcome. Grade A is the most manageable and will receive the most focus. Grade B is less important or less controllable and will receive far less attention. Grade C will be virtually ignored. Underlying this approach is the notion that 20% of the work elements should probably get 90% of the attention.
- (b) Assign cost responsibility to an individual for each major element.
- (c) Require a specific cost management plan for each element. What are the cost targets? How will performance be measured? What kind of data will be reported and when? Are project meetings to review cost required? How are changes to be handled?

- (d) Create a project-unique reporting system based on the elements.

Cost Trend Program: A “cost trend program” is an early warning mechanism for cost changes. Whenever a potential cost change starts to appear, even if on a very preliminary basis, it is immediately added to the list and given visibility. Items remain on the list as they are refined, with cost impacts added. The intention is to surface potential cost issues soon enough to permit some level of mitigation.

Change Evaluation and Approval: Scope changes are the biggest threat to project and other budgets. Unfortunately, the deck is often stacked in favor of changes in that the project sponsors often have an incentive to “improve” the project. As a result, there is no effective argument advanced against such changes and management hears only one side of the story. Cost support personnel should be the advocates for cost. To the extent changes are not necessary, cost support personnel should provide management with a strong enough argument and supporting analyses to reject those changes.

A Framework. As a further, and more detailed, assist, we have provided an outline of various implementation tactics that one might consider as they implement the holistic approach. Again, these are sample activities that may or may not be appropriate. They at least can serve as clarifying examples of the key components of an holistic approach. This framework is included below.

6. Sample Cost Management Implementation Tactics

Our preference is to avoid any prescriptive “laundry list” of implementation tactics. Since the Company has already bought in to the concepts we have offered, we are confident they can do a good job of designing an implementation strategy that best meets their needs. Accordingly, we offer this list only as a sample of the kinds of tactics that might be considered.

COST MANAGEMENT FRAMEWORK

(A) Elements of A Guiding Philosophy:

1. Executive commitment
 - Communicate cost control expectations
 - Empower an independent cost oversight organization
 - Maintain constant visibility and cost emphasis throughout the year
2. The priority of cost management
 - Provide a place for cost in the hierarchy of priorities
 - Include cost management metrics in pay-for-performance goals
 - Require a price tag, no matter how crude, for any proposed solutions to identified issues
3. Independent oversight
 - Establish a cost management organization with the director reporting to COO
 - Assign all cost related functions under the purview of the cost management director

- Build an efficient cost control/service network by assigning financial and cost professionals to the responsible line managers while maintaining their technical direction from the cost management director
- 4. A coherent statement of policy
 - Include cost management philosophy in vision, mission, strategies and goals at the senior management level
 - Reflect cost management objectives in the work plans at the working level
 - Emphasize cost control in addition to financial oversight
- 5. A strong cost culture
 - Display a high degree of cost awareness at all levels
 - Prudently balance costs versus risks in decision making
 - Maintain accountability of each individual for optimizing costs

(B) Elements of A Structured Cost Management Plan:

1. A well communicated plan
 - Publish official document
 - Review status monthly
 - Post relevant cost management information on Website
2. A formal process
 - Delineate how costs will be managed
 - Define objectives and expectations
 - Identify essential cost elements
 - Design a plan of implementation
3. Organizational responsibilities
 - Identify overall accountability of each major process
 - Evaluate and concur with plan by all the major work groups
 - Monitor compliance to the plan by all participating managers
4. A focus on “cost control” instead of “cost oversight”
 - In process – real time, not after-the-fact
 - Anticipatory – proactive, not reactive
 - Managing, not reporting
 - Integral participation, not arms-length involvement
 - Focus on analysis, not numbers
 - Focus on improvement, not measurement
5. A focus on cost drivers
 - Identify cost trends early
 - Perform insightful analysis from available data
 - Evaluate cost versus risk on major scope growth items
 - Take timely intervention to mitigate cost overruns

(C) Elements of Cost Management Building Blocks:

1. Management systems versus monitoring systems
 - Develop a proactive mode of operation to anticipate potential problems
 - Design a cost trend program as an early warning system
 - Institute a rigorous project management process
 - Adopt a risk assessment program to better evaluate exposure to cost and scope growth
2. Credible cost control baselines
 - Prepare sound capital, O&M, and clearing budgets
 - Develop comprehensive cost estimates for major capital and O&M projects
 - Calculate the unit cost or reasonable expectancy of measurable work items based on quantities and standard productivity rates
3. Accurate cost collection
 - Continue to use DOCS for productivity reporting
 - Continue to use PRANO system for capital cost reporting
 - Continue to use Functional Category for O&M cost reporting
4. A Focus on Individual Performance
 - Continue to use Productivity Index to measure the performance of the physical workers and the supervisors
 - Perform in-depth analysis to identify root causes that impacted productivity, and provide recommendations to mitigate similar situations in future
 - Review periodically to evaluate if the implementation of recommendation is effective in improving productivity
5. Effective performance measures
 - Continue to utilize existing productivity measures (DOCS standard, RE, etc.)
 - Develop a more complete set of metrics (Balanced Scorecard) to measure performance in all key areas, namely, (a) Safety /Environmental & Health, (b) Operation Excellence, (c) Customer Satisfaction, and (d) Cost Management
 - Provide instant linkage of measures from senior VP to general manager levels
 - Include in-depth analysis (with corrective action recommendations and potential cost impacts) in metrics that are not meeting or on the verge of not meeting objectives
6. Targeted initiatives
 - Set up special effort or task force to attack major problems identified
 - Assess the magnitude of total cost impact
 - Monitor the progress and continuous cost impact until the effort is completed
7. Skilled cost professionals
 - Continue to appoint financial analysts to perform budget analysis
 - Continue to assign cost engineers and experienced estimators to perform cost estimates

- Provide personal development training to upgrade the cost control techniques and business analytical skills of all the cost professionals in the whole company
- 8. Establishment of cost control/service network
 - Continue the current financial control and operation assessment organization for Electric Operations in the regions (the same applies to Gas Operations, Steam Operations, and Central Operations)
 - Provide cost support functions to the regional managers
 - Assist the accountable general managers to fulfill their cost management responsibilities
- 9. A focus on analysis
 - Perform insightful root cause analysis on substantial deviations from cost control baseline
 - Develop predictive analysis of expected final costs
 - Provide recommendations and corrective action plans for major unfavorable deviations
- 10. A focus on corrective action
 - Develop an attitude of ready intervention
 - Be ready to resolve problems with innovation and boldness
 - Tally cost avoidance or cost savings on successful efforts
- 11. Continuous improvement
 - Implement a formal, structured program that:
 - Define major initiatives
 - Perform cost/benefit evaluation
 - Document resulting intangible benefits and cost savings, if any
- 12. Benchmarking
 - Internal Benchmarking: Implement a formal, structured program for the regional representatives to:
 - Share success stories on work units with superior productivity rates
 - Document commitment to adopt shared methodologies or lessons learned
 - Prove effectiveness of implementation in other regions in terms of cost savings achieved
 - External Benchmarking:
 - Designate a few Electric Operations planners as company representatives to participate in EUCG (Electric Utility Cost Group) and PSE&G Peer Panel to:
 - ✓ Network with industry peer professionals
 - ✓ Exchange continuous improvement ideas
 - ✓ Identify relevant best practices for internal implementation
 - Likewise, designate a few Gas Operations planners as company representative to continue to participate in AGA benchmarking effort, but also participate in PSE&G Peer Panel.

B. Work Planning

1. Background

The effectiveness of an operation always starts with good planning. Work Planning is a comprehensive and systematic approach to coordinate the accomplishment of the work that needs to be done. We will evaluate the main work management process and all the supporting functions, such as assembling of work packages, work breakdown structure, estimating, material management, technical support, fleet management, etc. We will also examine whether this process is consistent with the budgeting system as well as properly linked to the management of projects and programs.

The criteria by which Liberty evaluated work planning included the following:

- Work packages for physical workers should be designed to clearly communicate the key elements of the work and allow employees to optimally complete the work.
- Work crews should have timely access to good technical support.
- A Material Management Program should be in place that is integrated with the work planning process and assures timely availability of necessary components.
- Equipment and vehicles should be ample in quantity and their design should be consistent with efficient completion of the intended work.
- A clearly defined work breakdown structure (WBS) should be in place that parses the work in logical categories consistent with the managers' needs.
- A credible estimating process should be in place with standard work tasks, procedures, unit rates, estimating guidelines and capable estimators.
- The work management process, encompassing all of the above criteria, should link seamlessly with established projects and program management systems.
- The work management process should be consistent with the Company's budgeting system and link to that system where appropriate.

2. Findings

a. Work Management Processes and Work Packages

i. Work Management Process

The Work Management Process of various business units has essentially the same five basic phases:

- i. Initiation – There are two basic types of work, Planned and Unplanned. Planned Work could be new business, service requests, preventive maintenance, compliance work, asset inspections and routine replacements. Unplanned Work is mainly response to emergencies and the resulting repairs. Work can originate from an external system or a manual process.
- ii. Planning - Emergency complaints or new leaks are dispatched immediately. New service requests are driven by customer demand and required date. Inspection work is planned to meet the next due date. Repairs are based on targets and severity. For Electric Operations, cable and transformer upgrades are driven by load analysis. For Gas Operations, main

- replacements and expansions are determined by mandated replacement programs and economic evaluation of repair versus replacement. All work will be prioritized and adjusted as emergency work is received.
- iii. Scheduling - The schedule is dynamic and based on workload and crew availability. Work is assigned to crews in advance for inspections, repairs, new business, and core maintenance work. Emergency work can be dispatched electronically or distributed manually in the form of hard copy of work packages. If an outage is required, outstanding work will be bundled and combined into one package.
- iv. Execution - For emergency work, a work ticket containing essential information for troubleshooting is generated electronically. For Planned Work, a work package will be assembled for the work crews. The package will contain a detailed description of work to be performed, job location, permit requirements, plate number, parking restrictions, drawing number, work items, associated work units, quantity to be installed, account number, estimated work hours, completion date, etc. Job briefings and walkdowns are performed prior to implementation, as appropriate. Required tools, materials, and permits are picked up. After the work is performed, results are recorded, either electronically through a wireless field device or manually on paper and later entered into a work management system. Actual material used is recorded. Additional work is identified and noted.
- v. Completion - Work is reviewed to ensure all labor, materials and other costs associated with the job are recorded. Permits are returned. Inspection data gathered will be reviewed for accuracy and completeness. Any required follow-up work will be noted. Labor hours and accounts are reported. Completed work units are manually recorded for performance measures and tracking. The job will then be closed out.

ii. Work Management Tools

All business units have tools to manage the following types of functions:

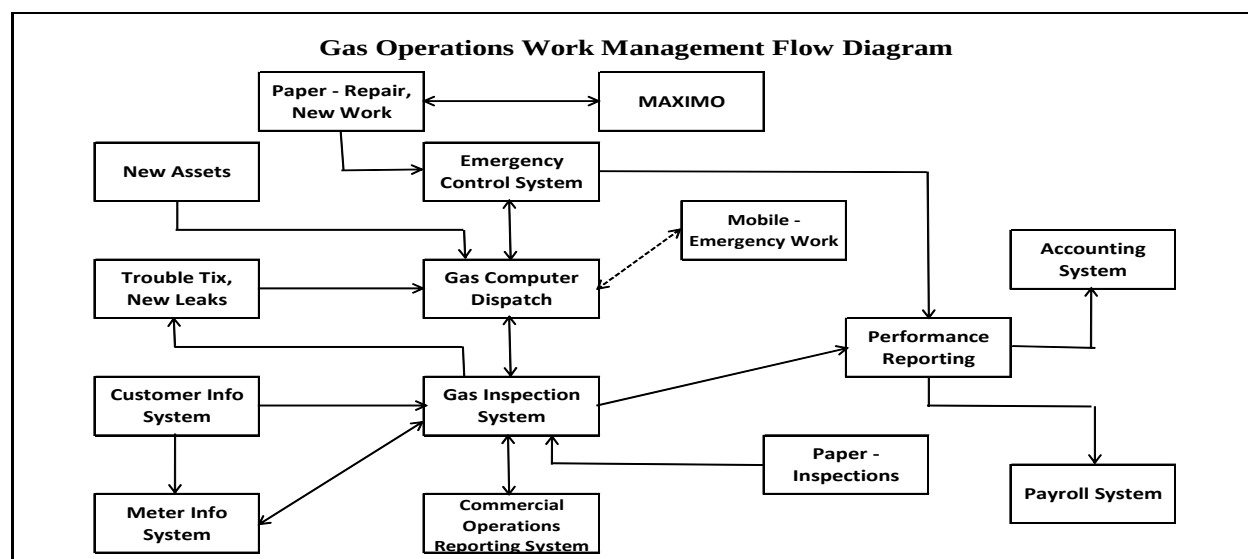
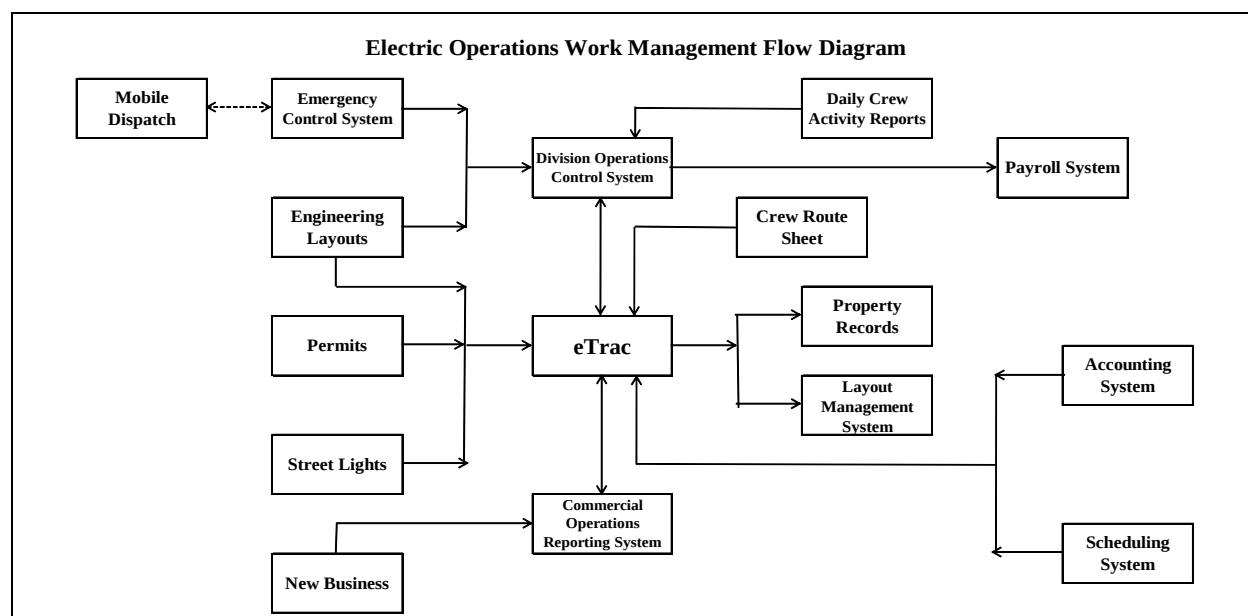
- Job planning
- Work dispatching and tracking
- Inspections
- Workforce scheduling
- Layout Tracking
- Emergency control and response
- Support functions, such as material management, customer tracking, time reporting, accounting, outage scheduling, property record, productivity measurements, etc.

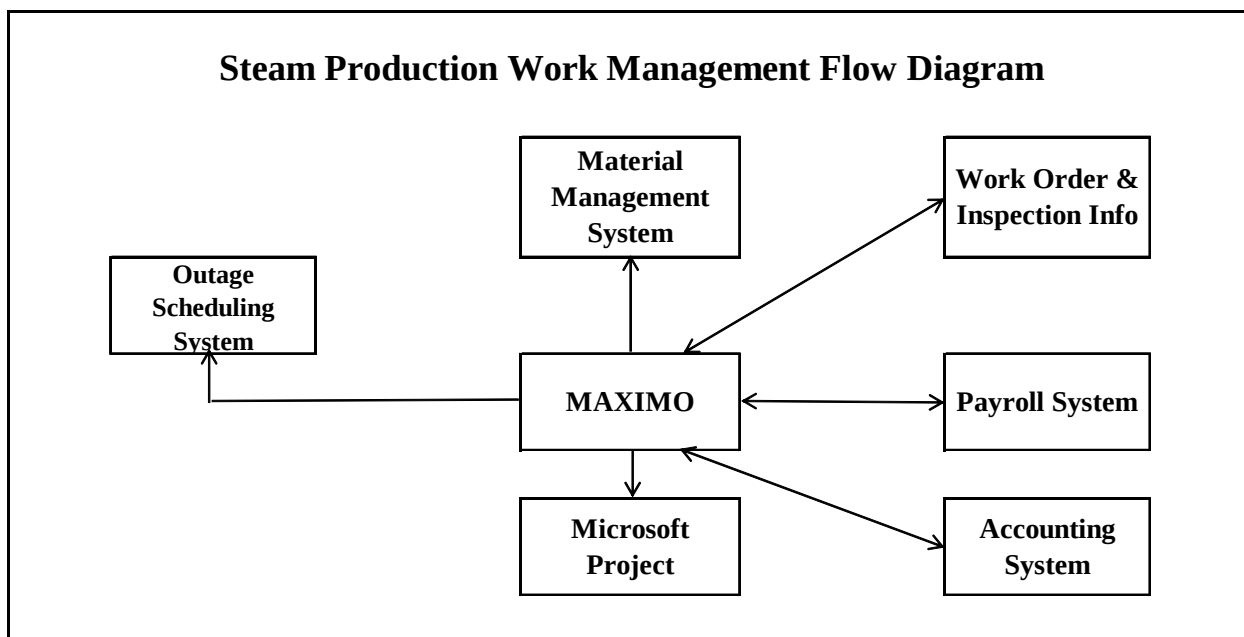
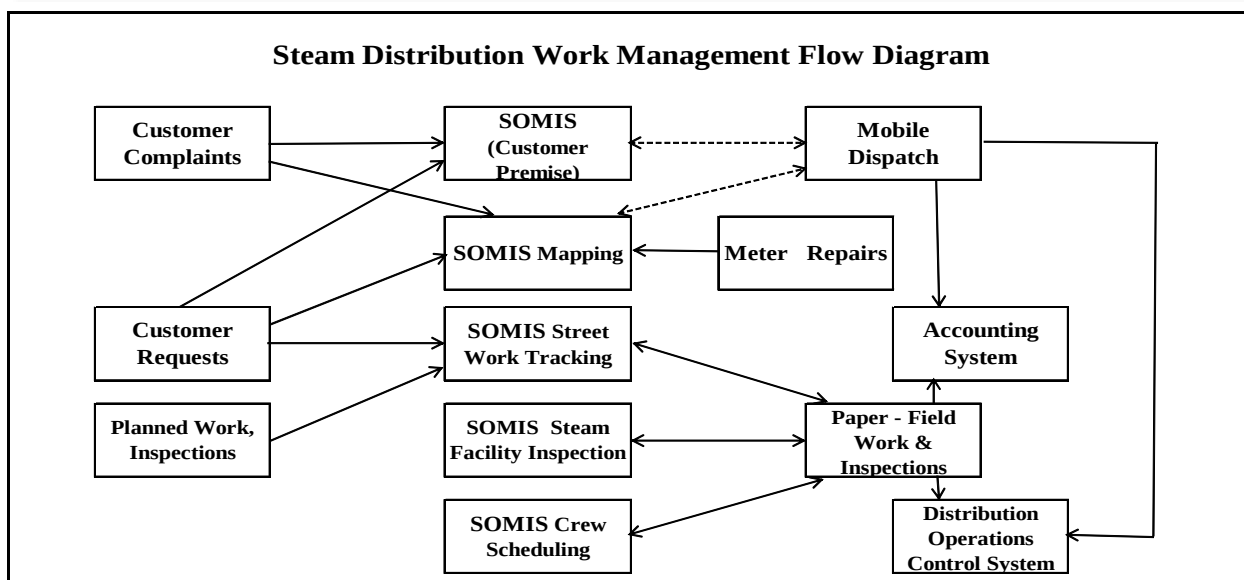
Collectively these tools are developed and procured over the course of a long period of time to meet arising needs. Hence, the level of sophistication varies. We have found at an overall level that the tools are adequate but not overly effective. Con Edison also realizes that some of the legacy systems are antiquated and already has several initiatives in place to upgrade some outdated systems. The objective is to provide better interfaces and streamline processes. These initiatives have been reviewed and endorsed by the business units.

For example, the Mobile Dispatch System will eliminate the need for daily route sheets and Daily Crew Activity Reports. The Integrated Mapping platforms will provide a common repository for all assets. The PeopleSoft will replace the current time reporting system of union personnel for payroll purpose. The Gas Inspection System will take on new functionality to handle also complaint work, construction repairs, and miscellaneous work.

iii. Work Flow Diagrams

To illustrate the comprehensiveness of the work management activities, the work flow diagrams of the various Business Units are depicted below:





iv. Work Packages

A work package is a definitive and discrete unit of work that can be assigned to a work group to accomplish in a normally short duration of time. It communicates to everyone having the collective responsibilities to complete this defined scope of work. The criteria for defining work packages are as follows:

- Each work package is clearly distinguishable from all other work packages
- Each work package has a scheduled start and expected finish date
- Each work package has an estimated work hours assigned over the scheduled duration

- Each work package contains all the essential information, such as safety, description of work, material requisition, engineering sketches, locations, etc.

A work package is the product of the work management process. There are two types of work packages in Con Edison. They basically contain the following information:

Emergency work – emergency ticket number, call number, task number, associated work unit (AWU) number, emergency control system (ECS) number, reported date, scheduled date, dispatch time, location, problem description, component (such as meter or valve) location, component access information and instructions, route number, feeder number, customer interface, component location, Mains and Services (M&S) plate number, parking restrictions, etc.

Planned work – layout drawing number, job identification number, work authorization (WA) number, location, description of work, plate number (gas plate, steam plate, Mains and Services plate, conduit plate), reference number, network number, work item number, associated work unit (AWU) number, location code, account number, specification number, type of equipment needed, best time to perform work, contact name, required permits (parking, castings, street lights, open mains, retail and major electric & gas, system reinforcements, Department of Transportation, public improvement, overhead), code 753 reference number, material requisition form, assigned work hours, parking restrictions, job safety plan, construction work estimate (CWE), and budget and schedule information, if applicable.

b. Technical Support

Engineering provides extensive technical support throughout all phases of physical work. The scopes of the support for various business units are as follows:

i. Distribution Engineering

Responsible for providing design, procurement, and estimating services for the new business, major projects, reinforcements, and interference work in the electrical distribution system of all the Customer Service regions.

ii. Gas Engineering

Responsible for providing engineering for new business services, main design, major project field engineering, gas transmission and distribution line integrity management, and approval of new materials and methods.

iii. Central Engineering

Responsible for the following engineering functions:

- Mechanical Engineering services required to support generation stations' operations and maintenance
- Control Systems Engineering services for relay protection system standards, design, and analyses for new projects and existing systems

- Design Engineering services for all company electric, gas and steam generating plants, electrical substation and transmission, and commercial facilities
- Electrical Engineering services for all Substation Operations, Transmission Operations, and the Steam Business Unit
- Equipment and Field Engineering support service for operation of substations during normal and emergency conditions
- Environmental Engineering support services for Substation Operations and System & Transmission Operations

iv. Steam Power Plants

Central Engineering has assigned several System Engineers to each of the steam power plants to address day to day issues. Reporting to the Equipment and Field Engineering section, these System Engineers serve as a ready resource for engineering response to issues that arise. For issues that are beyond the scope of work to be done by a System Engineer, an Engineering Service Request can be generated.

c. Material Management Program

i. Procurement Process

The Purchasing department is responsible for the procurement and supply management of all goods and services for Con Edison with the exception of fuel, real estate, financial services, legal service, and employee benefits and insurance. The group manages the company's inventory, and handles the sale of disposed assets in its resource recovery group. The responsibilities of the Purchasing Department include: processing purchase requisitions, preparing bid packages, performing commercial evaluations of bids, preparing purchase orders, negotiating prices, terms and conditions, preparing corporate requisitions and purchase orders, covering multiple stock, keeping units through its Materials Management System (MMS), managing the Supplier Diversity Program, administering the automated Purchasing Management System (PMS), One Stop Shopping System (1SS) and the Contractor Oversight System, administering the Procurement Card (P-Card) Program, and qualifying new suppliers.

The operating groups at Con Edison participate with Purchasing in several components of the purchasing process. They include identifying new vendors and qualifying their products/services and determining the best procurement method for handling a given business requirement.

For material purchases, the operating groups are primarily responsible for the following functions: purchasing goods and services under the Procurement Card (P-Card), specifying products and services to be purchased, and requisitioning them, expediting purchases and coordinating delivery, inspecting materials received from vendors, receipting for delivery of goods and services, authorizing payment of vendor invoices, authorizing releases against blanket, term, and system orders, and performing technical evaluations.

Con Edison's policy is to procure equipment, materials, and services necessary for the conduct of its business through the solicitation of competitive bids or proposals from vendors who have

been previously qualified by the Company. Negotiations with suppliers are conducted when it is determined that negotiations between the vendor and the Company will more effectively achieve an acceptable contract.

An Invitation for Bid or Proposal (IFB) conveys to the vendor the requirements for the material or service that the company intends to buy, and is an organized, proactive means of soliciting quotes from prospective vendors. The invitation is generally solicited electronically.

Purchasing generally prefers firm or fixed-price contracts; either a lump sum where the entire scope of work is performed for a single price, or, when a job unit price is impractical, contracts wherein each item of supply or service is defined and carries a separate price.

ii. Unit-priced contracts

- Systems Contracts - An arrangement whereby a vendor maintains required levels of support and rapid response, covering a broad commodity area of stock items, delivered directly to designated company locations, within a specified time frame. A variant of the systems contract is cross-docking contracts, which require the vendor to maintain its own inventory, accept orders, and make "same day" deliveries to the company's central warehouse.
- Term Order for Stock Material - An arrangement whereby a vendor agrees to supply quantities of a specific list of stock-numbered items, based on delivery requests issued by Materials Management. Vendor deliveries are made directly to the company storerooms in accordance with quoted lead times.
- Blanket Order for Services or Non-Stock Materials - An agreement whereby a vendor, in accordance with prearranged prices and terms, supplies specified services or non-stock materials at various company locations

iii. Procurement Methods

The Company's general policy is to procure materials, equipment, and services competitively. Purchasing will generally place blanket purchase orders, when possible, for commonly used material, equipment and services rather than procuring them individually for each project. This allows for improved volume purchase savings.

However, there may be circumstances where the competitive method may not be practical. In such cases, a non-competitive or sole-source procurement may be used. Such procurements require appropriate written justification for the non-competitive or sole-source procurement, which could be done for several reasons, including availability of technology and also unique design or engineering skills.

A contract award may be made to the vendor with the lowest bid or lowest evaluated price. Awards may be split among two or more vendors for a variety of reasons, including, to ensure that there are a sufficient number of vendors to perform the work, to encourage competition in the market, and to ensure adequate supply, among other reasons. The company is committed to the development of its Supplier diversity. To support this program, awards or portions of awards

may be made to diverse firms whose bid price exceeds the lowest bid. Bids will be invited when the specifications of the material or services to be furnished are generally standard, there are a number of equally acceptable suppliers, and the award will be based on price or other quantifiable non-technical factors.

In capital projects, the user organization issues requisitions to Purchasing for major equipment, long lead materials, and construction contracts. Purchasing obtains proposals for major equipment and long-lead-time material items and awards the contract. Materials and supplies are also available through Company storerooms or blanket orders.

iv. Bid Evaluations

The Company uses a variety of methods to determine the award of a contract. The bid and proposal evaluation process is intended to provide a systematic manner in which to compare the factors affecting the quality and cost of materials or services being procured by the company. Negotiations will be conducted, as appropriate, to reduce pricing.

v. Stocking and Inventory Management

Both the User Organization and Purchasing have defined responsibilities in the identification and the management of items that are maintained in the Company's inventory.

vi. Approval of Standard Materials

Engineering utilizes industry-wide standards that are published by various engineering organizations for approving items used on the Con Edison electrical system.

vii. Delivery Process

Con Edison's main warehouse, the Astoria Distribution Center, is located on the Astoria complex and managed by Central Field Services - Stores Operations. All Cross-Docking items (defined below) and approximately 95% of all inventory items are processed through this facility. In addition, Stores Operations manages 11 regional storeroom facilities throughout the service territory. These storerooms stock, distribute, and control the inventory levels of materials utilized by work crews that maintain energy delivery systems in the service territory.

The order fulfillment process (picking, packing and delivering) is managed both by Central Field Services - Stores Operations and Fleet Operations. The process of getting users (internal customers) ordered material begins with the customer placing a request that falls into one of the following categories:

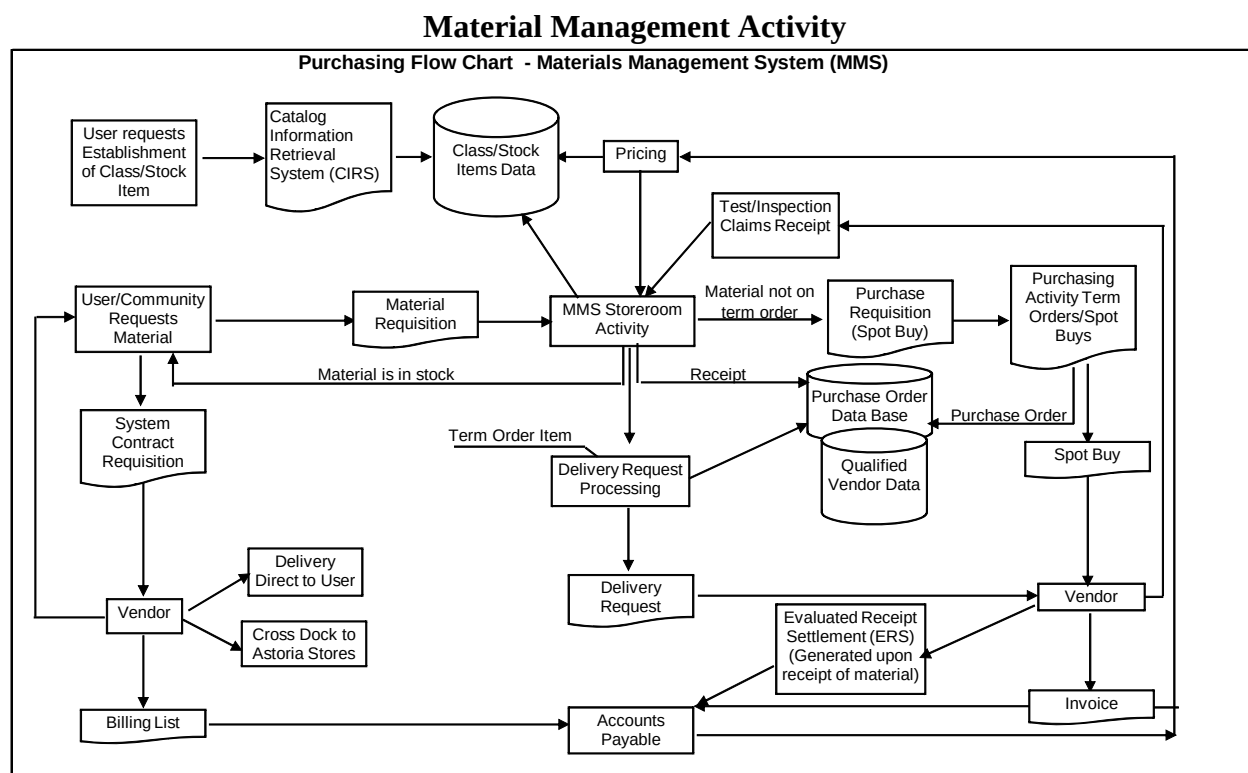
- Warehouse Items – Warehouse items are stored in the Astoria Distribution Center warehouse and are picked from inventory, packed, and placed on a truck for delivery to its designated location Monday through Friday.
- Cross-Docking Items – Cross-Docked items are ordered through contract vendors by customers and are shipped to the Astoria Distribution Center warehouse Monday through Friday. Once the items are received, they are immediately packed and placed on a truck for same day delivery to its designated location.

- System Contract Items – System Contract items are ordered through a contract vendor by the customer. These items are delivered directly to the customers' location by the vendor.
- Will Call Items – Will Call items are ordered by the customer through the Astoria Distribution Center warehouse and the customer will pick these items up at the warehouse.

Stores Operations coordinates with Purchasing and internal customers to plan for direct deliveries from supply vendors to designated locations. These direct deliveries are used when there are large quantities of job-specific material that can be staged at a contractor's yard or job site.

Fleet Operations manages the delivery process utilizing a fleet of vehicles which includes tractors, trailers, box trucks, rack trucks and vans. Material is delivered overnight to workout locations and during the day to field locations and contractor yards. The delivery operation is coordinated at Con Edison's Astoria complex.

The following flow diagram depicts the essential material management activities.



d. Fleet Management

Con Edison's fleet of mobile equipment is used primarily for the construction and maintenance of its electric, gas, and steam systems. To a lesser extent, it is used by supervision for oversight of both Con Edison employees and contractors performing work. It is also used in routine tasks such as meter-reading, customer operations, and inspection of infrastructure. The size of the fleet is largely a function of the physical work volume performed by those organizations.

The fleet is managed by the Transportation Department. The original acquisition costs are funded from the annual capital general equipment budget. The operations and maintenance costs are charged back to the organizations based on the actual costs associated with that organization's equipment.

There are basically nine classes of vehicles and equipment (V&E) in the company's fleet: passenger vehicle, light duty vehicle, medium duty vehicle, light-heavy vehicle, heavy duty vehicle, ancillary equipment mounted on self-propelled vehicle, trailers, and power construction equipment. The total fleet size has been climbing steadily at 4% for the past three years.

Total Fleet Size

Description	2003	2004	2005	2006	2007
Self Propelled Vehicles	3,659	3,570	3,770	3,893	4,073
Trailers	309	323	336	344	352
Constr Eq and Forklifts	763	760	760	809	823
Ancillary Eq Mounted	682	695	754	776	779
Total	5,413	5,348	5,620	5,822	6,027
Percent Change		-1%	5%	4%	4%

The corresponding total cost had also started to climb at the same period, but it started to taper off from a peak of about +15% per year during the 2003 to 2005 period. It should be pointed out that most of the significant changes occurred in Electric Operations:

Department Costs

Department (All Costs in millions)	2003	2004	2005	2006	2007
Electric Operations	15.3	17.5	20.3	22.2	21.4
Gas Operations	4.4	5.0	5.7	5.9	5.9
Steam Operations	0.6	0.7	0.7	0.7	0.6
Construction Services	1.0	1.3	1.4	1.5	1.6
Systems & Transmission Operations	0.5	0.6	0.8	0.9	1.0
Substation Operations	0.6	0.7	0.8	0.9	1.0
Customer Operations	1.0	1.1	1.2	1.2	1.1
Total	23.4	26.9	30.9	33.3	32.6
Percent Change		+14%	+15%	+8%	-2%

i. External Benchmarking

For external benchmarking, Con Edison has participated regularly with Utilimarc, a fleet benchmarking company located in St. Louis Park, Minnesota, and periodically with PA Consulting Group. As part of the continuous improvement effort, the company has reviewed the staffing requirements of its maintenance and repair facilities with Transportation Consultants, Inc. (TCI). The adoption of a point system by dividing the vehicle maintenance work into three major categories and the ensuing workload analysis enabled the Transportation Department to better utilize its mechanic resources and enhance performance.

One way to evaluate the cost effectiveness of fleet management is to examine the annual total cost on a per vehicle basis. Total costs include:

- Ownership cost – leasing, rental, depreciation, interest, and licensing
- Operating cost – company mechanic labor, contract mechanic labor, parts, and fuel
- Support costs – management and support staff, facilities, shop supplies.

We acknowledge this average cost per vehicle is heavily dependent on the make-up of the types of vehicles in the fleet. However, it is still a valid global approach to examine this normalized cost when comparing a company's fleet from year to year as well as comparing to industry average. Con Edison has participated in this benchmarking effort conducted by Utilimarc.

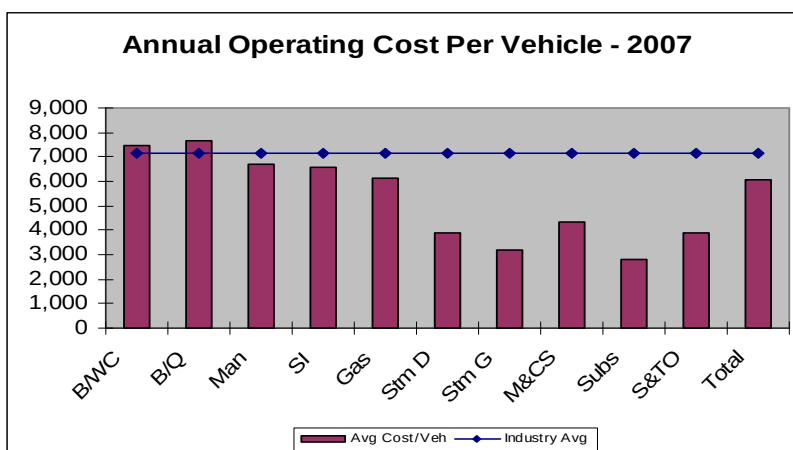
The Cost Per Vehicle of \$15,400 for Con Edison compares favorably to the industry average of \$17,500. This is due mainly to the fleet make-up of Con Edison, which has a smaller service territory, lower percentage of overhead network, and higher customer concentration. When we examined the individual vehicle category, especially the larger vehicle and equipment, Con Edison does not compare favorably. For example, the Cost per Vehicle of Bucket Trucks for Con Edison is \$38,700 versus industry average of \$36,200, and Digger Derricks for Con Edison are \$47,000 versus industry average of \$36,000.

Another interesting indicator of this Benchmarking Study is to measure the annual cost per vehicle based on weighted Maintenance and Repair Hours. In this measurement, Con Edison's \$360/vehicle is higher than the industry average of \$290/vehicle.

These few indicators should be monitored and analyzed for potential cost savings opportunities by identifying best practices from Con Edison's benchmarking partners.

ii. Internal Benchmarking

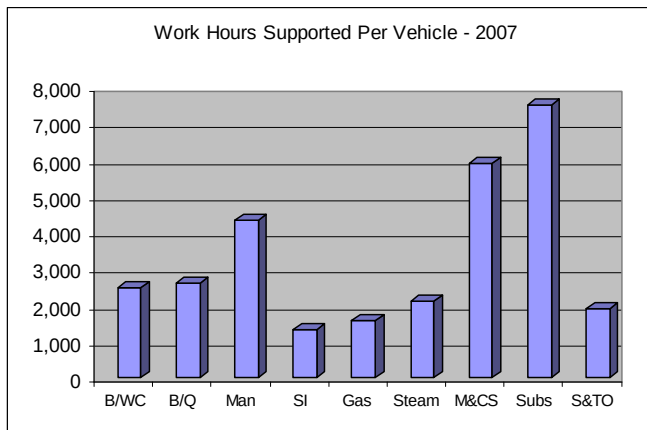
The concept of benchmarking the Cost Per Vehicle can be taken internally to compare among different business units and regions. Because of the way the vehicles are funded out of the capital budget, and the Transportation Department is providing the same services to all the users, it is much simpler just to compare the annual Operating Cost Per Vehicle. For example, the comparison of the complete operating fleet cost among users is illustrated in the table.



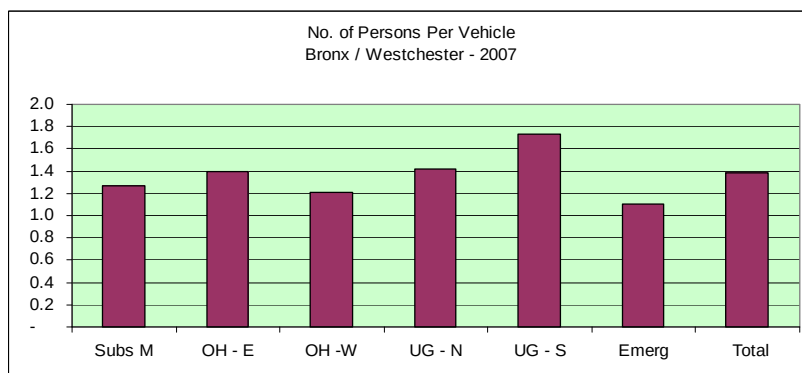
Again, we acknowledge this average cost per vehicle is heavily dependent on the make-up of the types of vehicles in the fleet. It is still a good idea to monitor the profile from year to year to see

if any user has significant cost savings or growth. It is certainly a good idea to compare the cost per vehicle by vehicle type, such as service truck, van, digger derrick, etc., to identify the user that has the best practices.

Another way to evaluate the fleet efficiency is to look at how much the vehicles are utilized to support physical work. Again, the make-up of the fleet for each work group is different. However, the following measurement is still a good overall gauge within each functional group on how the fleet is being utilized from year to year. As volume of work increases or decreases, the fleet size of a functional group can be adjusted accordingly.



Another way to evaluate the fleet size is to monitor the number of persons per vehicle. The following chart is developed from a Crew/Vehicle Analysis performed by Bronx/Westchester. The vehicles assigned to each section within the region are linked with the supervisors and workers using the vehicles.



This measurement might not be valid to compare across business lines because of the difference in nature of work, but it again is a good tool to compare oneself from year to year. If the nature of work is similar across different regions, such as overheads in Westchester, Brooklyn/Queens, and Staten Island, the

comparison might yield some beneficial analysis that will help the managers to make prudent decisions.

e. Work Breakdown Structure

Effective planning requires that work activities be broken down to the appropriate 'task' level to permit accurate cost estimating and scheduling of resources. The Work Breakdown Structure (WBS) is a representation of the work elements in a descending level of detail. The work should be broken down until an adequate and manageable level of detail is reached for reasonable duration and cost estimates. The WBS for the various business units at Con Edison is totally different because of the nature of their work, but the underlying structure is similar. Jobs are performed and measured at the "account" level. The cost and productivity are reported at the "account" level and can be rolled up to the "functional" level.

For capital work, PRANO (Property Record Asset NO.) codes are used to capture the quantity and costs to satisfy property record requirements. The capital functions cover new business, system reinforcements, replacement on gas mains, meter installation, etc.

For O&M work, each business unit has designed its own set of accounts with appropriate level of details to schedule and implement its work. The O&M functions cover emergency response, routine maintenance, scheduled inspections, corrective maintenance and repair, service cut-offs and reconnects, etc.

In general, the WBS of Con Edison is simple and reasonable in defining its own framework of deliverables and tangible outcomes that allow its managers and supervisors to manage and control the work adequately.

f. Cost Estimating Processes

Cost estimating is the process of approximating the probable cost of a defined scope of work based on information available at the time. Each business unit in Con Edison has a different cost estimating process. This is driven by the different nature of their work. Each has a different set of tools. The cost estimates are also performed by personnel in the respective organizations with slightly different backgrounds.

i. Electric Operations

All Designers under this title in the Regional Engineering and Customer Engineering Groups perform estimating functions at some level using either PRANO (Property Record Asset Number) unit costs or the Division Operations Control System (DOCS) as part of the functions.

Order of magnitude Estimates – They are performed in advance of the final engineering layout for large projects such as a load transfer. The estimate is based upon the number of sections, and the availability of manholes and conduits from Conduit and Duct Occupancy records. This order of magnitude is then measured against current unit costs, and an original project cost estimate is established.

DOCS Estimates - After the engineering layouts are finalized and ready to be issued to various Construction organizations, a final estimate is completed. Standardized calculations are performed by DOCS using corporate and/or division rates/percentages/costs where applicable, making the system a divisional estimation system. The rates/percentages/costs used for the calculations are those periodically published or updated by various central organizations (e.g., General Accounting and Property Records departments).

Estimated costs are generated using the corporate and/or division data retrieved from the system tables and data bases and applying the data to Engineering Layout Master Work Code details. Engineering Layout Master Work Codes are found on each item of work identified on a layout that is issued to the Construction organizations.

ii. Gas Operations

Gas Operations divides capital programs into routine capital projects and larger capital projects. Routine projects are small in scope and are part of capital programs such as new business, system reinforcement, corroded steel mains, and cast iron pipe replacements. Larger capital projects include those to install transmission or supply mains, regulator stations, etc.

Estimates for the smaller routine projects are created using one of two unit price estimating spreadsheets. These spreadsheets were created using standard work units derived from their existing contract items. The costs are updated annually using historical data from current contracts. These spreadsheets are self explanatory because they utilize standard work items and units; as such, guidelines or procedures are not required.

Estimates for larger capital projects are created using CEES (Central Engineering Estimating System). The methodologies for creating estimates are detailed in the CEES Procedure.

iii. Steam Operations

Cost estimates for the bulk of capital projects for Steam Operations are performed by Central Engineering for both generation and distribution. Cost estimates for small, emergency projects at the generating stations are performed by station personnel. The estimating process and methodologies are detailed in the Cost Estimating section of the Engineering Operations Manual.

iv. Central Operations

The Cost Estimating section was formed in 2006. Prior to that time the discipline engineers did their own estimating using the CEES system. This Group performs estimates for Substations, Transmission Operations feeder replacements, and Steam Operations projects.

The following types of estimate are performed during the different phases of a major project:

- Order-of-Magnitude Estimate (OME) – This is a cost estimate used for feasibility study, proposed project evaluation, comparison of alternate schemes and for annual budget requests. It is a rough estimate that is based on preliminary scoping information. Its purpose is to provide an approximation of project costs so the requestor can decide whether to proceed with the design of the project or to evaluate alternatives.
- Partial Appropriation Estimate – A partial appropriation is normally used for long lead equipment and material in advance of the total appropriation submittal. Partial appropriations facilitate the purchase of a long lead-time item to ensure delivery in time to meet project schedule.
- Total Appropriation Estimate – An appropriation estimate is an estimate that is used to appropriate money for a specific project. It covers all direct and indirect costs of the entire project including all labor, equipment, materials, corporate overheads, escalation, contingency, associated expenses and retirement costs. Such estimate is based on a detailed approved scope of work.

The general approach is that prior to estimate preparation, the estimators will walk down the job with engineering and field planners or supervisors to have a thorough understanding of the

scope. After an OME estimate is prepared, it will be reviewed and approved by the Project Manager (PM) and Project Engineer (PE). For the Appropriation Estimate, it will first be peer reviewed by the Senior Estimator and the Section Manager prior to being signed and accepted by the PE, PM and CM (Construction Manager). Once reviewed and approved, an estimate is owned by the Project Manager or estimate requestor. Once a project starts construction, the construction group owns the Construction Work Estimate (CWE) and must submit a re-appropriation estimate request.

v. Bid Check Estimating

This group reports to the Planning and Analysis department and provides accurate, competitive construction cost estimates, analysis and advice to insure the best value for the company. The core functions and the process of this group are as follows:

- Provide an independent fact-based cost estimate for competitive construction bids. This estimate is confidential until it is used by the company to check the validity of the Contractor's bids. If the lowest qualified bidder is not in-line with the company's Bid Check Estimate, a fact-finding process is conducted. This process often results in the Contractors reducing their bids, clarifications to eliminate contract scope ambiguities or re-bidding.
- Provide an independent Bid Check Estimate for Purchase Order Change Requests issued after the award of the contract. These estimates are used to negotiate pricing on changes to the scope of work during construction until the close-out of the project.

vi. Cost Estimating Tools

Listed below are the cost tools utilized by the various business units to prepare cost estimates:

- Electric Operations: DOCS Estimating System, Engineering Estimate Guideline
- Gas Operations: Central Engineering Estimating System, CEES Desktop Procedure
- Steam Operations: Cost Estimating spreadsheets, Engineering Operations Manual CE-0304 Cost Estimating
- Central Operations: Cost Estimating Model (Excel workbook), Central Engineering Dept. Cost Estimating Guidelines, Central Engineering Estimating Procedure CE-0304
- Bid Check Estimating Section: Central Engineering Estimating System, estimating reference publications, and Excel spreadsheet applications.

vii. Cost Estimators

- Electric Operations: Estimates are performed by regional engineers as required (80 in Manhattan, 54 in Bronx/Westchester, 72 in Brooklyn/Queens, and 15 in Staten Island).
- Gas Operations: Cost estimates of capital projects (supply mains, transmission mains, regulators, etc) are developed by project engineers (seven) and project managers (three). Cost estimates for capital programs (new business, system reinforcement, meters, leaking services, corroded steel mains, and cast iron pipe replacement) are prepared by the approximately twenty experienced engineering supervisors and design technicians who are responsible for creating the layouts for each area.

- Steam Operations: Steam generation cost estimates are prepared by station personnel. Steam Distribution project cost estimates are developed by Central Operations Cost Estimating Group.
- Central Operations: Prior to March 2006, the discipline engineers performed their own estimates using the CEES system. Currently the cost estimating staff consists of 10 Con Edison employees and 3 contractors. The estimators are assigned by discipline: seven civil, five electrical and one mechanical.
- Bid Check Estimating Section: There are nine company employees in this group.

g. Project Management Processes

Each business unit in Con Edison has its own Project Management process. The overall principle is essentially the same. Depending on the nature of the jobs, the projects may be managed a little bit differently. The basic processes for the business units are discussed in the Project Management chapters of this report.

h. Work Management Processes Consistency with Budget

All business units plan and manage their work in accordance with the approved budget. They all use the budget as a baseline to monitor their costs and productivity. Hence, all the cost reporting tools are designed to align with the budgets. Monthly cost variance reports and productivity reports are generated to monitor the actual of the following key items against the budgets (for both capital and O&M):

- Units Installed
- Hours Expended
- Costs Incurred
- Hours Per Unit
- Cost Per Unit

These are the major cost elements considered. The information is available at the functional and account levels for both the capital and O&M work. This is also how the business units budget and manage their work.

3. Conclusions

1. The work management processes for all physical work are pertinent, logical, and comprehensive.

Con Edison work planning processes consider all the essential details. The planners are experienced and possess good judgment. Even though overall efficiency is hampered by the great varieties of tools that are not integrated, the work packages delivered are of good quality.

2. The current work management system is essentially a work dispatching and work planning tool, not a complete system that is dynamic enough to manage real-time progress, productivity, and costs.

The existing work management system is very efficient in dispatching work. Once the work request enters the system, the planners start the planning process and work orders or requests will get executed in the field to complete work. However, the system is incapable of managing progress, productivity, and costs. The planners or financial supporting staffs have to maintain a separate system on the side to provide management with the required information. As a result, every area might use a slightly different approach. Essential features are lacking, and critical information on real-time progress, actual productivity, and on-going costs becomes unavailable.

A recommendation for a new work management process and supporting system for Electric Operations is discussed in detail in Chapter XIII.

3. The technical support before and during field work is responsive and timely.

The engineering organizations are conscientious about providing full and timely support to the workforce in the field. The engineers usually solicit input from the field planners and supervisors in the initial walkdown of the design. They will conduct another walkdown to go over the details on more complex jobs. They try to anticipate potential problems by providing the crews with supplementary drawings and sketches to assist them to understand the totality of the scope. They also provide around the clock coverage while the physical work is being implemented in the field. From our discussions with planners and supervisors during the interview sessions and field visitations, they all indicated that the technical support had been excellent and seldom resulted in any down time.

4. The material requisition system is effective in securing competitive pricing; the delivery of required components is well planned and expedient; and the warehousing system is efficient.

The procurement process is rigorous and covers the essential elements. It ensures qualified suppliers to provide best pricing via competitive bidding. It utilizes several types of unit pricing contracts to secure best values. The warehouses we visited are well organized and stocked for regular materials. Arrangements to deliver heavy equipment to jobsites are well planned. Decisions not to deliver some materials to the jobsite are appropriate, considering the environment of some parts of the city. Pickup of distribution poles by the crews from the laydown area on the day of installation is a prudent practice. From our discussions in the interview and field visitations with the planners and supervisors, downtime due to material unavailability was kept to a minimum.

5. Mechanics are proficient and productive in maintaining vehicles and equipment. Work crews are able to mobilize readily to work locations in a reasonably expeditious manner.

The average annual operating cost per vehicle of Con Edison compares favorably to the industry average established by Utilimarc. The adoption of a point system to better utilize its mechanic resources and enhance performance is a good practice. From our observations and discussions with planners and supervisors in the field visitations, the work crews are able to get to the work locations. Despite having to carry an extra trainee in some crews, transportation to the worksite is never a problem.

6. Criteria for optimal fleet size are not established.*(Recommendation 1)*

For more effective fleet management, Con Edison wants to avoid possessing excessive vehicles and equipment. This might not be easy, as some vehicles are used for around-the-clock coverage. As more General Utility Workers get trained or more workers retire, the size of the workforce is going to expand or contract in order to satisfy the ever-changing work demands. It is desirable to be able to readily adjust the fleet size accordingly.

7. The current work breakdown structure provides adequate and essential details for the managers and supervisors to manage the physical work.

Productivity is adequately and appropriately monitored at the work unit level and functional level. The current work breakdown structure provides logical and essential details for the managers and supervisors to manage the physical work.

8. The Cost Estimating Process is comprehensive and effective, especially in Central Operations, which has a dedicated, professional cost estimating group

The Central Operations Cost Estimating Manual and Cost Estimating guidelines provide comprehensive and instructive information for estimate preparation. The cost estimates prepared by the Cost Estimating Group in Central Engineering are thorough and well-presented. Electric Operations and Gas Operations also possess in-house estimating procedures and tools for proper estimate development. The estimates prepared by the engineers or managers are satisfactory and serve their purposes. The build-up of productivity rates based on work unit standards is reasonable. Review of final estimates by Construction adds credibility to the cost estimates. The Bid Check Estimating Process is also an excellent undertaking.

9. The same work management processes are used in a project environment in a consistent manner. However, the significant Cost overrun of several mega projects against the original or appropriation estimates caused major concerns among stakeholders.*(Recommendation 2)*

There is always the misconception that the performance of the cost estimator determines the quality of the final estimated cost. It is true that an experienced cost estimator following an effective cost estimating process can produce quality estimates. Contingency can offset some unforeseen cost caused by inherent uncertainties at the time of the estimate preparation. Once the project team members review and accept the estimate, the project manager owns the estimate. Any significant scope growth or development outside the original assumptions needs to be addressed and communicated immediately. To wait until the end when the actual cost overruns the original estimate is a major failing of the project manager, not the cost estimator.

10. The work management system is consistent with the company budgeting system.

Work plans are managed within the budget constraints. Productivity reports are all designed to compare the actual performance versus the budget. Low priority work gets delayed if funding is not available or when the budgets start to overrun.

4. Recommendations

1. Establish fleet size criteria based on historical data on total vehicle usage hours versus total physical work performed in hours in the region for each vehicle class. (*Conclusion 6*)

The amount of work within a region should determine its fleet size. Because some vehicles are being used on multi-shifts, the best way to determine the fleet size is to measure the usage of each vehicle. Once this information is collected, the first performance indicator is to compare the usage of each vehicle against the average of vehicles in the same class. This simple way will isolate which vehicle in what region is being under-utilized. The second performance indicator is to establish a relationship between the total vehicle usage hours and total physical work performed in work hours. Once historical trends are established, management will be armed with some intelligence to decide when to reduce or add vehicles, pending availability of future workload information.

Benefits: better decisions in fleet management

Costs: Nominal – should be able to incorporate into regular activities.

2. Perform in-depth reconciliation on cost estimates with substantial overrun to better understand the root causes of deviations. (*Conclusion #9*)

Presently, reconciliations of major project overruns are performed on request. We recommend all major projects over \$3 million that experience overruns of 15% should have a reconciliation performed to understand the underlying reasons of the cost growth. Sound cost management demands knowing what factors will drive costs, whether the project teams make good judgment in weighing risks or priorities against cost, and whether upper management has the opportunity to determine the appropriate path to take. Hence, an insightful project reconciliation will educate everyone involved regarding what were the major cost drivers and what could have been done differently. The current process does call for the sharing of lessons learned at the end, but they are generally more of a technical nature. They should be expanded to include how the project team could have responded differently to reduce costs. It should be noted that the reconciliation can be performed by anyone familiar with the projects, not necessarily the cost estimating group.

Benefits: Better understanding of lessons learned; higher sensitivity to costs

Cost: Nominal – should be able to incorporate into regular activities

C. Resource Management

1. Background

Effective resource management encompasses the planning, development, deployment and facilitation of a skilled, productive workforce. In this evaluation, we will focus on the physical workforce. The effectiveness in managing the workforce tells a great deal about the quality of management, systems, people and a company's ability to get things done.

In evaluating the management of the physical workforce, we will examine all the crucial factors. The first one will be supervision effectiveness, as the planners and supervisors are the cog that

makes the wheel turn. Other areas we will examine are the safety and training program; work rules and labor agreements; crew size and structure; overtime and shift strategies; and contracting strategies and practices.

The criteria by which Liberty evaluated resource management included the following:

- Supervision should effectively function to facilitate the work, including assurance of adequate personnel, support resource where necessary, material availability, management of travel and other downtime, adequate work packages, crew instruction, safety measures and all other local facilitation activities.
- Training requirements for physical workers should be formally defined and compliance should be monitored.
- Standard crew sizes, or crew structure tailored to specific projects, should be optimal.
- Management should emphasize the need for efficient work rules and practices in labor agreements and ongoing negotiations.
- A formal safety program should be in place, with suitable oversight by an independent organization.
- Guidelines for the scheduling of overtime should be in place to prevent excessive overtime during normal operations. Similarly, guidelines for shift strategies for multi-shift operations should be in place.
- The Company's labor contracting strategy should be defined and should provide for the optimum use of the Company's fixed resources.
- Lesser cost resources should be used for "low end" work (flagging, digging, material delivery, clean up, etc.) in order to optimize use of skilled resources.

2. Findings

a. Supervision Effectiveness

In the analysis of productivity and work force effectiveness, the role of supervision is often misunderstood. Conventional thinking often suggests that effective supervision means getting the maximum effort from people by pushing them hard, enforcing work rules and demanding a maximum effort at all times. In reality, supervision can produce real productivity gains more from facilitating the work than from "bossing" the worker.

Assuring that crews are prepared for the work, that materials are readily available, that engineering information is in place, that the work package is adequate, and that safety considerations have been discussed allow crews to perform at their optimum, without interruption.

i. Supervisory Ratio

Effective supervision is crucial to efficient workforce management. The nature of the work demands varying degrees of supervisory requirements. Such requirements are generally not totally rigid and should be adjusted, depending upon the skill level of the crews, the urgency of the jobs and the traveling distance of the service territories. The following table summarizes the span of control of supervisors (supervisor to worker ratio) among different business units.

Table XII.3

Business Unit	Region	Function	Supervisory Ratio
Electric Operations	Manhattan	Regular	1:11
Electric Operations	Manhattan	Emergency	1:10
Electric Operations	Manhattan	Underground	1:12
Electric Operations	Manhattan	Installation & Apparatus	1:13
Electric Operations	Brooklyn / Queens	Underground Splicing	1:9
Electric Operations	Brooklyn / Queens	New Business, Cable Repl	1:10
Electric Operations	Bronx	Load Relief, URD, Pub Imp	1:9
Electric Operations	Westchester	New Business, Development	1:6
Electric Operations	Westchester	Locate & Restore Services	1:6
Electric Operations	Staten Island	Overhead	1:9
Electric Operations	Staten Island	Underground	1:6
Gas Operations		Regular	1:9
Gas Operations		Day Shift	1:12
Gas Operations		Swing Shift	1:6
Steam Operations		Distribution	1:6
Steam Operations		Station	1:12
Central Operations	Construction Svc	Cable Pulling & Splicing	1:12
Central Operations	Construction Svc	No Lights, Home Svc, Network	1:6 ¹

In general, a supervisory ratio ranging from 1:8 to 1:10 is reasonable. A wider service territory, such as Westchester, Staten Island, Construction Services, warrants a lower ratio.

ii. Interviews and Field Observations

To understand the roles and responsibilities of the supervisors, Liberty interviewed 16 Con Edison employees in that role. In addition, the following work was observed in the field.

- Business Units covered:
 - Electric Operations: Manhattan, Brooklyn/Queens, Bronx/Westchester, Staten Island
 - Gas Operations: Bronx, New Rochelle, Bronx Zoo
 - Steam Operations: 59th Street Station, Steam Distribution in Manhattan
 - Construction Operations: Brooklyn
- Observations:
 - Average travel time between jobs
 - Crew size, including number of general utility workers

¹ In their review of the draft of this review, CECONY questioned the accuracy of this number but did not provide a corrected value. Liberty was advised in an interview that there was one group performing this work with one supervisor overseeing three two-men crews. We therefore have no basis for any other number at this time.

- Fleet size
 - Supervisor interfaces with work crews
 - Safety consciousness of work crews and supervisors
 - Completeness of work packages
 - Any material delivery issues
 - Any QA holdups
 - Any required immediate technical support
 - Implementation of physical work
 - Confidence and skill level of work crews
 - Oversight of contractors
 - Low end work
 - Potential work delays
- Typical Activities:
 - Electric Operations: Cut and rack in manholes, D-fault repairs, removal and replacement of defective cables, cable splicing, damaged pole replacement, street lamp restoration, tool room tour, and control room tour
 - Gas Operations: Layout work, gas line installation, excavation work, and trenchless pipeline replacement and removal
 - Steam Operations: Response to customer complaint on stuck valve, and turn on steam inlet valve
 - Construction Services: Replacement of temporary jumpers from light pole into the house.

b. Training Requirements of Workers

Con Edison has instituted a set of very comprehensive training courses to establish a career path for its workforce. The duration that takes a General Utility Worker (GUW) to reach a high job title may vary from three to seven years, depending on the nature of the work within a business unit. The number of courses required to reach a top level job title are summarized as follows:

- Electric Operations – 25 for “A” Mechanic, 35 for Distribution Splicer, 46 for Underground Troubleshooter Dispatch, 42 for Chief Overhead Line Constructor High Voltage, 31 for Senior Field Operator
- Gas Operations – 19 for “A” Mechanic, 23 for Troubleshooter
- Steam Operations – 26 for “A” Mechanic, 28 for Troubleshooter, 37 for Construction Inspector
- Construction Services – 32 for “A” Mechanic.

c. Crew Size and Structure

i. Crew Size and Structure

The crew size and structure for various business units vary with the tasks performed. Generally speaking, the crew size is established at two. However, with the training of General Utility Workers (GUW) to replenish the expected retiring workers in the next few years, quite a few crews are carrying extra GUW. To the extent possible, a GUW can be assigned to team up with an experienced crew leader. The table below summarizes the crew structure.

Business Unit	Function	Normal Crew Size	Carrying Extra G UW	Multiple Crews
Electric Operations	I&A	2		
	Underground	2		
	Troubleshooting	1	No	
	Overhead	2	Yes	Yes
	Cable Pulling	2	Maybe	Yes
Gas Operations	Regular	2	Maybe	
	Troubleshooting	1	No	
Steam Operations	Distribution	2		
	Troubleshooting	1	No	
	Station	1		
Construction Services	Regular	2		Yes

Con Edison has the flexibility to determine the crew size. The only exception is in Overhead work. The following work functions are staffed in accordance with the Collective Bargaining Contracts with Local 1-2 and Local 3:

Overhead Work Function	Job Staffing Level
Setting Poles	2
Towing Pole with Trailer	2
Install Primary Wire Gap two spans or less	3
Install Secondary Wire Gap two spans or less	3
Primary Phase Check	3
Install Transformer / Regulator	3
Install Transformer / Regulator with Material Handler	2
Transfer Primary (4kV, 13kV, 27kV)	3
Install Primary Taps	3
Transfer Primary Junction	3
Cut & Kick Primary Riser or Equipment Pole	4
Transfer Secondary	2
Frame Pole	2
Connect and Energize Transformer	2
Install Primary Riser not including cable truck	3
Install Terminator Pothead Cutout	2
Install & Connect Recloser and Capacitor	4
Install & Connect 600A Switches & Lightning Arrestors	3
Install & Connect Oil ESCO Switch	3
Install / Remove Primary Breakers	3
Install Secondary Riser Connect Pole	3
Install more than two sections of aerial or open wire	5

ii. Resource Relocation

The Contract provisions allow the company, whenever the need arises, to temporarily reassign one or more employees to perform work in another region, whether it is routine or emergency. In both cases, volunteers are generally sought in seniority order and if the need still exists, assignment is based on “juniority.”

Article XI of the Local 1-2 Contract and Article 2 of the Local 3 Contract, generally known as the Management Rights Clause, provides that the right to “assign, supervise and direct all working forces...are recognized as vested exclusively in the Company.” Compliance with other provisions of the Contracts such as Hours and Working Conditions, Hours of Work, Overtime, Premiums, Call-in, Scheduling and Work Assignment is essential to relocation of workers.

d. Efficient Work Rules and Labor Agreements

In accordance with the 2004-2008 Collective Bargaining Contract between Con Edison and the Utility Workers Union of America AFL-CIO and its Local No. 1-2 and Local No. 3, the following provisions offered the company flexible work rules and favorable agreements to enhance efficiency. On-trial employees, weekly schedule change, call-in for emergency service, contract out work, working in inclement weather, promotion, portion of wage increase performance-based, performing some functions without direct supervision, and work schedule exceeding sixteen consecutive hours.

At this writing, the new contract is not available in final form. It is Liberty’s understanding and assumption that our comments or references, although made to the 2004 contract, also apply equally to the 2008 contract.

e. Safety Program

Liberty completed a high level review of Con Edison’s safety priorities and performance. Our findings and conclusions are described below, but such an analysis does somewhat of a disservice to the simple reality that two worker fatalities resulted from on-the-job electrical incidents in 2008. For our purposes, further analysis is superfluous – Con Edison’s performance fails any reasonable test, based simply on the 2008 tragedies. Based on the Company’s response to the incidents and its evaluation of safety performance and goals, it is not clear that the Company agrees with this conclusion.

i. The Environmental, Health and Safety Policy

In reviewing Con Edison’s policies and practices on safety, the Company has expressed on its website a strong commitment to safety, as follows.

Con Edison is committed to continue to strive for excellence in its environmental, health, and safety performance while complying with all laws and regulations that apply to company operations. Business and operational decisions throughout the company incorporate environmental, health, and safety aspects into the decision-making process. All employees of the company are held accountable for knowing the corporate environmental, health and safety requirements that apply to their

assigned responsibility and for using the information in planning and completing their work.

“In support of this policy, the company:

- Maintains procedures and provides training to meet the corporate environmental health, and safety standards*
- Openly communicates environmental, health, and safety issues with employees, customers, and stakeholders*
- Promotes effective environmental, health, and safety program management through auditing, monitoring, reviewing, and corrective action efforts*
- Advances the identification, analysis, and management of environmental, health, and safety risks to foster prediction and prevention efforts*
- Recognizes and encourages outstanding environmental, health, and safety performance*
- Strives to reduce waste and prevent pollution through recycling and effective work planning programs and promotes strategies for energy conservation*
- Maintains systems, procedures, and personnel to prevent incidents and, when necessary, to respond to emergencies*
- Promotes research to develop new and better technologies for environmental, health, and safety management*
- Establish metrics to track progress*

ii. Independent Safety Oversight Organization

The company has established an independent organization to oversee environment, health and safety issues. At the corporate level, the Environmental and Safety Committee is established to report directly to the Chief Executive Officer. Liberty examined the results of this team’s work over the last few years and gives it high grades for the level of participation, the commitment of the many members, the quality of the discussion and the actions resulting from the Committee’s work.

The Vice President of the Environmental, Health and Safety (EH&S) organization reports to the Chief Operating Officer. The main functions related to safety include managing the EH&S programs, overseeing the company’s safety commitments, developing company-wide action programs, maintaining workplace safety, ensuring compliance with Federal, State and Local safety regulations, providing operating organizations with guidance in implementing safety programs, approving safety products and chemicals purchase for use on company’s premises, and investigating work accidents in accordance with applicable procedures.

At the local level, there is an independent EH&S department matrixed to each business unit organization. In all cases, the manager of EH&S department reports directly to the Vice President of the supported organization. The major functions include providing overall direction and oversight for the development and implementation of safety, compliance, skills and on-the-job training, providing consultation and advice regarding various aspects of contractor regulatory

compliance, interfacing with regulatory agencies, and providing guidance to comply with safety standards and regulations.

One continuing negative in the safety program is the varying level of participation by the bargaining units. Although many companies have been able to draw a firm line between safety and other bargaining unit matters, this has not been the case at Con Edison, and contentious attitudes continue to spill over. It is clear that this serves neither the Company nor its union employees, and the continuing failure to bridge this gap represents a real hole in what should be an integrated effort at safety.

Although Liberty does not question the sincerity or commitment of any organization in pursuing safety, the lack of formal actions in the wake of serious incidents may not serve the Company well. Specifically, formal reports by the teams investigating fatalities are not prepared, presumably for fear of litigation. Board and Board committee minutes do not reflect any direction or concern² over such incidents. Such tragedies do not seem to be reflected in performance assessments at any level.

iii. Safety Training Program

Con Edison provides an extensive list of basic, initial and refresher environmental, health, and safety courses to all new and experienced field employees in accordance with local, state, and federal regulatory requirements. This list includes over twenty basic safety courses. Most of the courses are one-day. The career path for the type of work each employee performs determines their safety training requirements. Some basic courses are required just once, unless management deems their employee should be retrained. Examples of such classes are Permit Required Confined Space, First Responder at Operations Level on Emergency Response, Hazmat Technical Emergency Response, Hazwaste Generator, Hazwaste Transporter, and Hazard Communication. In certain cases, annual refreshers are required. Examples of such cases are Emergency Response, OSHA Millennium Program, CPR, Hazwaste Generator, Hazwaste Transporter, Handler Recertification, and Outside Fire School.

Additional environmental, health, and safety skills training courses may be required by particular job function. For example, annual OSHA training is completed by all field employees, and the OSHA course includes basic FRA (First Responder Awareness) training. Depending upon employees' work assignment and title, this training is supplemented by advanced coursework in similar subject matter.

iv. Safety Metrics

The Key Performance Indicators (KPI) approach was instituted in 2006 for the Management Variable Pay awards payable in 2007. The table below shows actual performance for corporate safety goals for the past six years:

² Again, we do not question the Board's concern, but simply state that such concerns are not communicated.

CECONY Operations - Safety Index								
Safety Index	Unit of Measure	2003	2004	2005	2006	2007	2008	2009 Targets
Safety Index:								≥75%
a. OSHA Injury/Illness Incidence Rate	Rate	4.92	3.97	3.30	3.41	3.47	3.00	≤3.29
b. Significant High Hazard Injuries	Number	N/A	N/A	25	17	26	5	≤11
c. Public Safety - Related Equipment Failures	Number	N/A	N/A	378	309	235	149	<234
d. Contractor OSHA Incidence Rate (Construction contractors only)	Rate	N/A	6.40	6.30	2.86	1.58	1.90	<3.20
e. Preventable Vehicle Collisions	Number	319	283	295	311	314	367	≤314
f. System Safety - Operating Errors	Number	N/A	N/A	138	121	109	122	≤104
g. Safety Strategy/Work Practice Improvements	Number	N/A	N/A	N/A	N/A	N/A	80	≥77
h. Documented Field Inspections	Number	N/A	N/A	N/A	N/A	N/A	27,437	≥19,292

These KPIs also exist at the component business units, and those targets follow the same pattern as the company-wide goals. It would be difficult to characterize the targets as aggressive, even mildly so. To the contrary, the targets seem to be sending a message that is at odds with an elevated safety culture. Half of the 2009 targets are a lot higher than 2008 actual. Also, in comparing the last four years of actual results to the 2009 targets, in only one case was the target an improved goal than all the actual rates, and in one case, the target was actually worse than the last three years.

Con Edison responds that setting targets at “best” levels is not appropriate and that a multi-year average makes more sense in order to have an achievable goal. While there may be a basis for such concern, the lack of more aggressive goals is not a particularly healthy signal.

f. Guidelines for Overtime and Shift Strategies

i. Overtime Policies and Strategies

From a company-wide standpoint, all business units are governed by the overtime compensation policies as follows:

- Human Resources Personnel Practices and Procedure E-1: “Overtime and Holiday Compensation for Management Employees.” This document provides administrative guidance for the compensation of management employees who work overtime and on holidays.
- The 2004–2008 Collective Bargaining Contract between Consolidated Edison Company of New York, Inc. and the Utility Workers Union of America AFL-CIO and its Local No. 1-2. This contract was current through June 28, 2008.
- The 2005-2009 Collective Bargaining Contract between Consolidated Edison Company of New York, Inc. (Staten Island) and the Local Union No. 3 of the International

Brotherhood of Electrical Workers AFL-CIO. This contract is current through June 27, 2009.

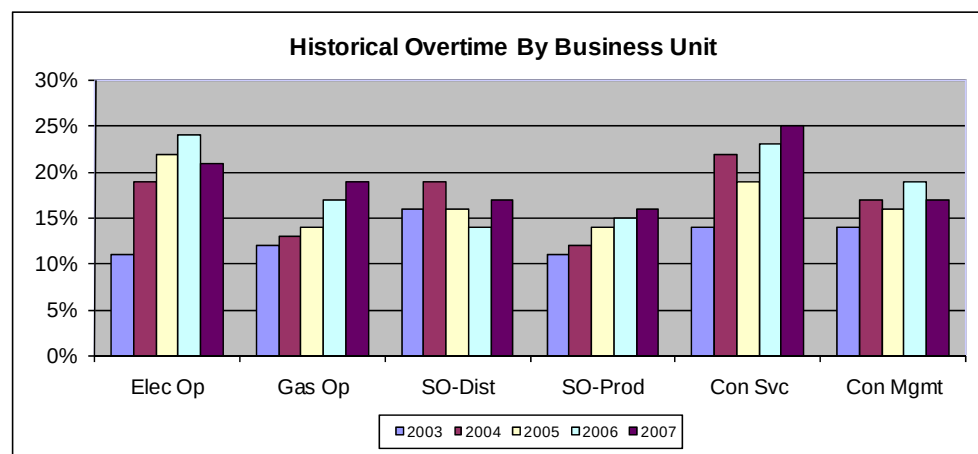
- The 2008-2012 Collective Bargaining Contract between Consolidated Edison Company of New York, Inc. and the Utility Workers Union of America AFL-CIO and its Local No. 1-2. While the major points of this contract have been finalized, grammatical and other minor revisions are still being made.

But while policies describe how overtime may be scheduled and compensated from an HR perspective, they do nothing in determining how overtime expenditures should be managed, how work schedules should be optimized, and what guidelines managers should use in making overtime-related decisions. Con Edison does not stipulate any official policies that help determine when or how much overtime can be used. For all the business units at the operational level, overtime management is largely entrusted to the local management teams.

To make their decision, managers weigh and prioritize these factors: public and employee safety, system and customer demands, budgetary/financial goals, human resource considerations, and other inputs. Some of the variables also considered may include emergency related demands, access issues, marginal time to complete a task versus revisiting the site with incremental cost for travel and re-mobilization, critical step of task completion, municipal and government permit stipulations, system integrity, customer operating requirements, and overall continuity of service to the customers. The balancing of these various factors seems to be intuitive and at the initiative of the decision-makers, as opposed to any structured policy or direction.

There is little analysis of overtime. A historical look at the percent overtime of the physical work force among the various business units for the past five years yields the following results:

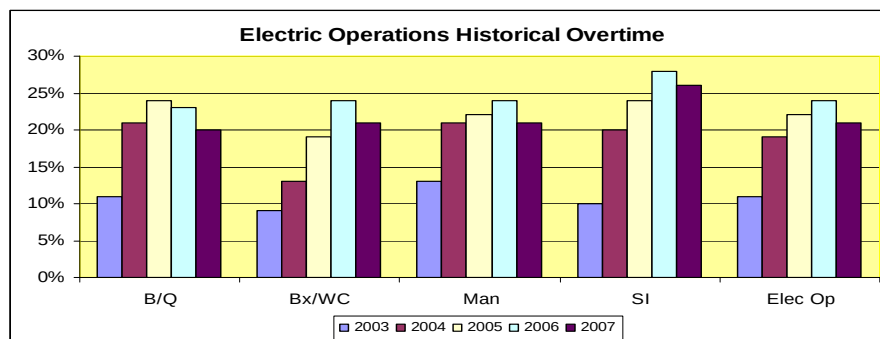
- Electrical Operations almost doubled (due mostly to burnouts and system reinforcements, and mildly to emergency response and transformers/structures/poles/meters/equipment)
- Gas Operations steadily climbing by 50% (due mainly to leaking services, leak repairs, pressure control and pressure response)
- Steam Distribution holding steady around 15%
- Steam Production also steadily climbing (due mainly to work for others and steam leaks)
- Construction Services climbing from 14% to 25% (reasons usually not readily visible due to chargeback to client groups)
- Construction Management holding steady around 15%.



A more detailed examination into the region of Electrical Operations confirms that overtime level has uniformly doubled during the past five years across the regions. Staten

Island is especially hard hit due to attrition and resulting productivity decline because of training great number of GUWs on overhead work.

The data suggests that overtime is bordering on being out-of-control³. This is suggested by the amount of overtime, now around 20%, and the trend, which has been relentlessly up, over the past five years. Most importantly, there seems to have been no consideration of these facts on the part of management – no analysis of the root causes, no analysis of cost and productivity impacts and no attempts at corrective measures. All of this raises a serious question of control.



Liberty is especially concerned about this trend because of what it might be saying about other related issues. For example:

- Are the additional hours indicative of added quantities of work or productivity declines?
- Is the workforce sized appropriately, or does this excessive overtime suggest a lack of resources?
- What actions have been taken by management as this trend has progressed? Were they aware and involved or is this now a surprise?
- What impacts do high levels of overtime have on costs and productivity?

The optimum level of overtime in any organization is a function of many things. In general, organizations should start with a simple philosophy – the less overtime the better. Overtime raises costs through premium time, reduces productivity (by major amounts when pervasive), can impact safety and lowers the quality of work life. Liberty cannot say what the optimum level of overtime is for Con Edison; but we can reasonably conclude that it is well under 20%.

In addition, the lack of a set of guidelines for managing overtime is a weakness. Con Edison should publish such guidelines so that managers have a framework within which to operate. The guidelines should contain a philosophy on the use and management of overtime and list the kind of thinking that supervisors should apply.

³ This is not a term we use lightly, nor do we use it for emotional impact. Rather it is a literal statement that defines (a) an undesirable result that is continuing as such or getting even worse with time and (b) management is either unaware or unable to take effective mitigating actions.

g. Contracting Strategies and Practices

i. Contracting Strategies

A significant part of Con Edison's core business activities are devoted towards construction activities required to support the generation, transmission and distribution of electric, gas and steam energy. Each business unit – Electric, Gas and Steam – involves key energy delivery systems that require seven days per week, twenty four hours per day construction support as part of their basic business support services. Each area is different with respect to the specific construction skill sets required to meet the core business needs.

ii. Approach to Contracting Physical Work

All business units essentially adopt the following approach:

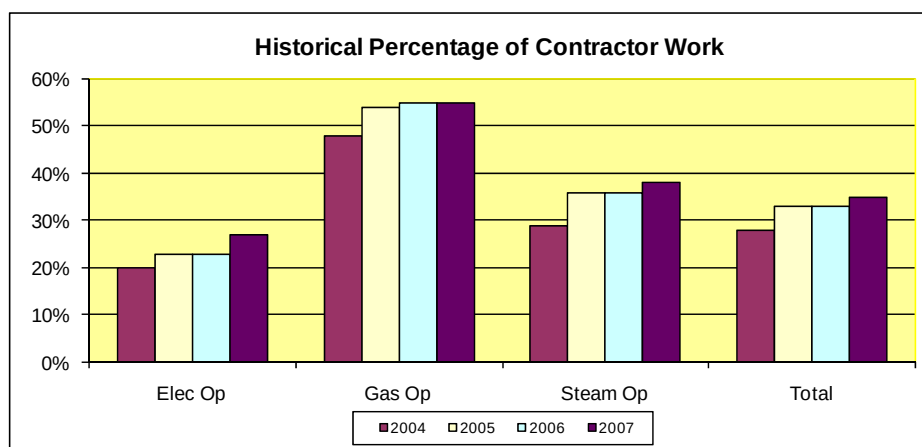
- a) Identify core work for Con Edison in-house workforce, such as emergency service repair and restoration, electrical equipment installation and maintenance, gas piping testing and repair, steam distribution system maintenance and repair, etc.
- b) Identify specific tasks to be performed by the Construction Services in-house labor force, such as street light repair, cable removal and installation, pipe installation, cable splicing, etc.
- c) Identify production oriented work for Unit Cost Contractors, such as tree trimming, spill barrier, excavation, trenching, paving, etc.
- d) Outsource Specialty work, such as special equipment maintenance, saw cutting, pipe coating, core drilling, pole inspection, etc.
- e) Outsource Low-End work, such as traffic control, parking coordination, and debris pickup.
- f) Use Per Diem Contractors to supplement in-house workforce during peak periods.
- g) Use contractors for major capital projects.

In the process of weighing in-house resource versus outside contractors, the following criteria are taken into consideration:

- Availability of skills required for the task
- Length of the project or program
- Efficiency to perform the task
- Cost to perform based on previous history
- Frequency of the type of work
- Completeness of the work package
- Duration required to procure the service
- Potential impact on overall schedule.

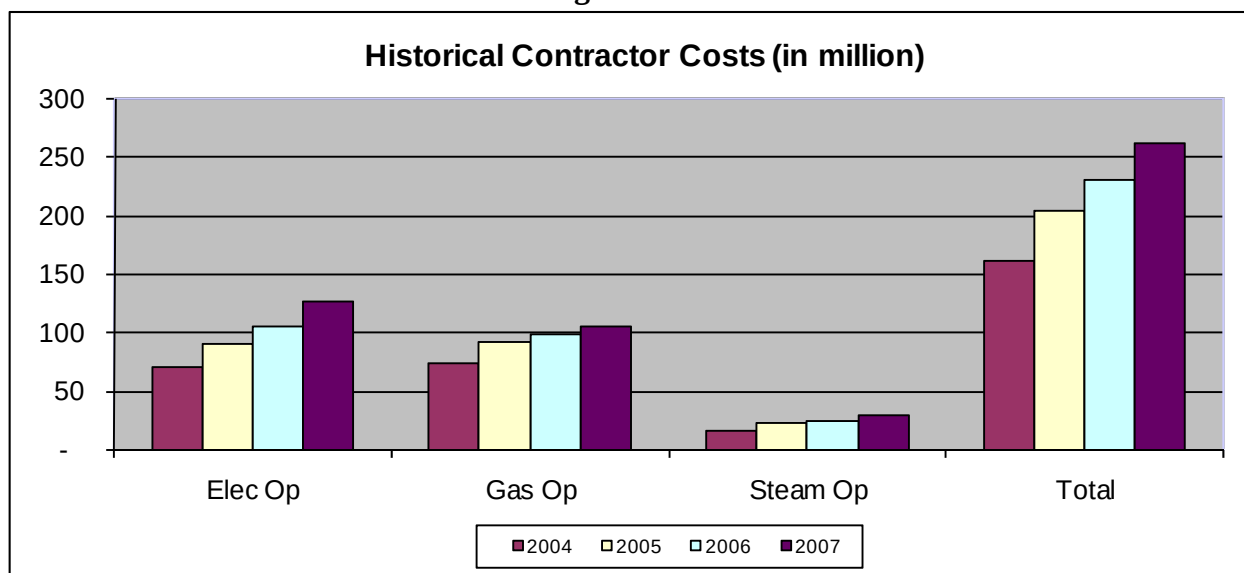
There are two major weaknesses that we can identify here: (a) Con Edison has no specific policy to determine in-house resource versus contractor labor and (b) the Company has been lacking an effective resource planning tool to manage its workforce on a long-term as well as short-term basis. Such weaknesses are exposed when examining the historical information for the past four years.

The percentage of total physical work contracted out has been climbing steadily from 28% in 2004 to 35% in 2007. The steady increase pertains to all three business units:



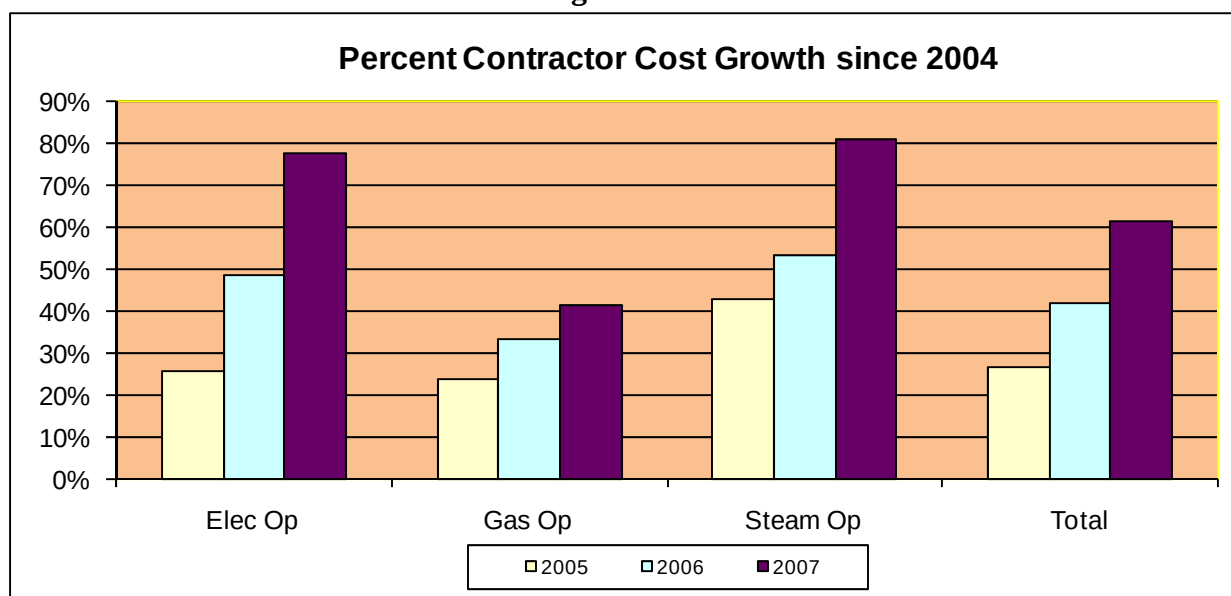
The story is more telling when we examine the contractor costs, which have increased by \$100 million in the past four years:

Figure 12.12



In terms of percentage of cost growth, the total contractor cost has increased by 62% since 2004. This substantial increase was driven by the required high percentage of capital work over this period. While it was appropriate to use contractors for specialty work and to manage peak workload, we identify an opportunity of improvement here if the Company could develop a capability to determine constantly and consistently the optimal in-house resource level. This issue of balancing in-house versus contractor resources will be addressed in the Recommendation section.

Figure 12.13



Con Edison apparently has recognized this second weakness. It has recently procured a resource planning model and hired a resource planning analyst. This will not only provide the business units with a better resource forecasting capability, but it should help them to utilize the in-house resources more effectively, and thereby curb contractor cost growth.

iii. Indirect costs associated with Contractors

When it is determined that work will be performed by contracted labor, it is customary that the Construction organization will provide the oversight and management for the selected contractors. Services provided by the Construction organization include coordinating the procurement of the contractor, monitoring the performance, insuring quality and specification adherence, administering safety and regulatory rules, documenting “as built,” administering payments, and acting as the liaison between the required organizations. The costs associated with Contractor Management within the Construction organization are applied to the work directly for Central Operations and indirectly as a percentage mark-up in the other organizations.

iii. Selection of Contractors in removing interferences

Con Edison has an extensive system of electric cables, conduits, structures and poles in addition to services and appurtenances of various sizes within the streets of its service territories. These facilities share the space under the streets with other facilities, such as telephone and cable TV owned by private utility companies and sewer, water and traffic facilities, owned by municipalities. In addition, electric overhead facilities share space above the streets with private and municipal facilities. When an entity plans to perform work within these streets and is prevented from completing the proposed plan due to other facilities being in the way, the term “interference” is used.

If a private entity decides to perform work in the vicinity of Con Edison facilities, such as the

telephone company installing a new structure around a Con Edison electric conduit, and Con Edison determines that the conduit needs to be supported, protected, adjusted or relocated to accommodate the work of the private entity, then the private entity is required to bear this cost. However, if the City of New York or another municipality performs work, such as installing a new sewer around a Con Edison structure, then Con Edison must bear the cost to move, replace, support and protect its electric structure affected by the municipality's construction activity.

The typical public improvement activities that affect company facilities are the installation of water, sewer and drainage facilities, reconstruction of bridges, roads, curbs and sidewalks, and the repaving of roadways. The Company's Public Improvement Engineering groups work with the builders to try to minimize the impact to the facilities. In order to resolve these interference situations, decisions are made on each project to either support and maintain Con Edison electric facilities or relocate them. The work is typically performed with a combination of Company and contractor workforces.

There are a variety of other methods used to accommodate the work but the basic premise is that the initial decision lies with the Public Improvement Engineering groups in coordination with the building agencies. Construction organizations within the business units along with oversight personnel within the Construction organization provide the necessary support to insure the identified plan is carried out. Ultimately, when the interference is originated by municipal agencies, it could be cost effective for their contractors to perform some portion of the trenching work. When the interference is originated by another entity, which has to bear the costs, Public Improvement construction groups will make the decision for the Con Edison workforce to do the work, if Construction Services has the resource to support it at that time.

iv. Contractor Management

Where required, contractor labor is obtained from Central Operations' Construction organization, a construction manager is provided to ensure oversight of contract labor following the procedures established in Contract Administration Manual, Contractor Oversight System, Contract Management Instructions, and EH&S Qualifications for Contractor Procurement. The purchase order, bid documents and specifications detail the controls and expectations for the work.

Con Edison has well-defined guidelines on contractor work. During the course of the actual contracted operations, trained inspectors monitor contractor performance to ensure that quality standards are being met.

Con Edison's approach to the use of contractors is based on the type of work to be performed and an in-house ability to do a certain amount of small-scale excavation. Con Edison uses contractors to perform work where it is more efficient to do so, such as for peak workload or when it does not have specialized forces to do the work. Contractors that install services generally operate on a blanket contract basis. Blanket contracts are awarded for a geographical area on a multi-year basis with options for additional years. The types of work covered under these blanket contracts are excavation work for emergency feeder work, open mains, paving, and new business work.

Construction Management Payment and Support System (COMPASS) is an application to document, initiate, and approve payments to contractors for items of work performed. Construction uses COMPASS to track items of work performed on Company's facilities, and to initiate and approve payments to contractors for completed work.

v. Contractor Safety Requirements

Contractors are expected to adhere to their own written programs, which are evaluated by Corporate EH&S as part of the vendor qualification process. In doing so, the Company is presuming that the safety requirements governing Con Edison and Contractors performing physical work equally cover various regulations, codes, and consensus standards, such as the Occupational Safety and Health Act (OSHA), National Electric Safety Code (NESC), and American National Standards Institute (ANSI). With the lone exception of Electrical Enclosed Spaces, the contractor safety programs are essentially all different, and it is not clear that this presumption of equivalence is accurate, nor is it clear that contractor programs necessarily rise to the same degree of rigor as Con Edison's own programs. Nevertheless, Liberty found no compelling evidence that contractor programs are inadequate.

Liberty did receive feedback and supporting documentation that contractor safety programs might not be managed effectively nor fully enforced. This has been an ongoing concern of the bargaining units that does not appear to have been adequately addressed. This does deserve management attention.

vi. Contractor Supervision

All the business units have procedures that lay out the requirements to oversee the contractors. There are also position guides, reviewed by the Human Resources Department, that define the qualifications, education, and relevant work experience. The general managers will identify and ensure the personnel are qualified.

The same qualification and experience requirements apply to internal and external candidates. The company will go outside only if no qualified internal candidates applying on the posting are found. The same interview process is used for external candidates.

In the event of poor contractor workmanship, Con Edison will backcharge contractors for the subsequent work in accordance with the Contract Administration Manual's provision, if the contractors have already left the premise. When improper work methods, poor workmanship, unsafe conditions, environmental infractions or unauthorized deviations from the contract requirements are observed, the Field Inspector will document the required corrective actions on the Contractor Field Observation Reports. If the contractor does not promptly respond to the verbal notification by taking the necessary corrective steps, the Field Inspector will document the condition by issuing a formal Infraction Report to the contractor with recommended remedial action. Should the contractor continue to be unresponsive, the Company will refuse payments or bill the contractor for required rework.

vii. Contractor Performance

The Construction Management organization manages the contractor performance by issuing a detailed monthly unit cost summary for various types of electric distribution contractor-supported work. The report backup information provides the number of units completed by contractors in each region and the associated costs to complete those units. The unit cost of each task is a composite of several activities that might include trenching, paving, manhole inspection, etc.

Samples of tasks monitored by business unit and by region are New Business Structure Unit Cost, Construction Trench Foot Unit Cost, System Reinforcement Structure Unit Cost, Street Light Construction Trench Foot Unit Cost, etc. However, these reports merely compare the actual to the budget rates. There is little analysis as to why the performance of some regions doubled the budget rates, or why the unit rate of some of the worst performing regions are 50% worse than the best performing regions. It is essential that deviations among contractors be viewed as a “red flag” that demands scrutiny and analysis. There can be many reasons for a contractor billing well above budget, and not all of them are honest or legitimate. Implementing the recommendations in the Cost Management Program will improve the quality and make better use of these contractor measurement tools for performance improvement.

viii. QA Inspection of Electric Contractors’ Work

Electric Operations centralized Quality Assurance in 2007. QA procedures and results prior to the centralization in 2007 were not standardized across all areas of Electric Operations and do not always lend themselves to comparison across years or operating areas. QA began performing inspections on Contractor work in 2008. In 2008, QA has inspected 1,254 locations of work performed by contractors. The rejection rate for these 1,254 inspections is 9.7% which compares favorably to internal rejection rates.

h. Lesser Cost Resources for Low End Work

For low end work that is substantial and discrete, it is more cost-effective to outsource to contractors to perform the work. All the business units in Con Edison employ contractors to perform low-end work, as appropriate:

- Electric Operations – street parking services, pole inspection, pole treatment, snow removal, and debris removal
- Gas Operations – flagging, watchman, parking coordination services, and site cleanup
- Steam Operations – snow removal, traffic control, and cleaning services
- Construction Services – traffic control, flush services, parking coordination services, and debris removal.

3. Conclusions

1. Supervisors and planners respond actively to construction issues and resource needs in the field.

During the interview sessions and field visitations, our observation was that all the supervisors and planners were knowledgeable about their work and possessed diversified experiences. The

work packages included adequate information to proceed with the execution of the jobs. The supervisory ratios are reasonable for the nature of the work performed. The supervisors provided essential crew instructions during the morning tailboard sessions as well as job briefings at the work site. They also provided on-the-job coaching to the trainees, as warranted. There were no material availability problems. Supervisors or planners effectively requisitioned materials for crew pick-up or arranged for site delivery of large equipment. Down time was minimal due to good work planning and making back-up work available in advance. The supervisors were familiar with the systems and tools. The planners were responsible for necessary training of the crews. They also had to ensure that resources were available to perform planned and unplanned work.

2. The training programs are generally adequate and extensive for physical workers.

The skill training requirements are extensive and exhaustive. Depending on the nature of the work, it could take three to seven years for a General Utility Worker (GUW) to reach the top of the progression line. The learning center is a spacious and well-equipped facility that is conducive to proper training. However, classroom training is only half of the training regimen. Con Edison has made great strides in training the GUW to replenish the anticipated high number of retirees in the next few years. For high risk jobs, such as distribution splicer and line constructor, the company needs to ensure that the GUWs and B-Mechanics have adequate on-the-job training before they are sent to work in high risk or high congestion areas.

3. There is a lack of long term resource capability analysis. (Recommendation 1)

Con Edison needs to develop a resource analytical capability on a more long-term and global basis. This is hampered by the uncertainty of a long-term demand picture, as the five-year projection of capital budget is unavailable or not dependable. This is driven by the budgeting process and will be addressed separately in this report.

The company has recognized, as part of its human resource strategy, the need for a robust workforce planning tool to help the managers to identify workforce needs in the future, to identify the gap between demand and supply for physical workers, and to make resource-related strategies. The company has selected the VEMO model, and hired a workforce planning analyst. This analyst will be used in managing and developing the data reports to be used in the workforce planning process.

4. There is a reasonable degree of flexibility in structuring crew size and allocating resources.

Other than the overhead work, Con Edison can determine the crew size to implement field work. The company also has the flexibility to reallocate resources to the proper work location without violating any collective bargaining agreements and the option to subcontract low-end work as appropriate.

5. Assessments of productivity and cost impacts due to the replenishment of retired workers by trainees are not being performed. (Recommendations 1 and 2)

For more effective resource management, the productivity and cost impacts of carrying an extra trainee on some work crews need to be continuously monitored and assessed. The company also needs to be aware of whether this burden is getting better or worse, as it might affect budget and goal performance.

6. Con Edison has a strong safety program, but recent fatalities, the post-accident actions of the Company, less-than-aggressive safety goals and continuing management / union contention raise effectiveness concerns. (Recommendations 4, 5, 6)

Even though Con Edison has established an independent organization to oversee the safety programs, maintained a comprehensive safety training program, conducted the necessary safety tailboards at job locations, and featured special safety topics at regular meetings, safety goals are not suitably aggressive and Company actions do not align with the words regarding safety priorities and philosophy. A full set of safety indicators are combined to form the safety index of the key performance indicators (KPI), but the targets are set at an easily achievable level. While the Company suggests that joint efforts with the unions are active and effective, this does not appear to be the case as there is continuing friction regarding safety.

7. The OSHA incident rate for Gas Operations (excluding Gas Engineering) is trending higher. (Recommendation 3)

The OSHA incident rate is based on the number of recordable incidents versus the hours worked. When Gas Engineering is excluded, the incident rate has jumped 60% in the last two years. Special attention needs to be paid to address this problem. At the same time, all the other business units can benefit from this effort.

GAS OPERATIONS - Safety Index							
Safety Index	Unit of Measure	2003	2004	2005	2006	2007	2008 Target
OSHA Incidence Rate	Rate	N/A	N/A	4.75	6.85	7.64	6.85
Significant High-Hazard injuries	Number	N/A	N/A	5	2	3	3
Public Safety - Related Equipment Failures	Number	N/A	N/A	12	11	14	11
Contractor OSHA Incidence Rate	Number	N/A	N/A	N/A	N/A	N/A	N/A
Preventable Motor Vehicle Collisions	Number	N/A	N/A	80	70	72	70
System Safety - Operating Errors	Number	N/A	N/A	59	61	51	53
Safety Strategy / Work Practice Improvements	Number	N/A	N/A	N/A	N/A	N/A	6
Documented Field Inspections & Safety Observations	Number	N/A	N/A	N/A	N/A	N/A	1,000

8. While contractor safety programs may be consistent with Con Edison requirements, there have been cases of inadequate implementation and enforcement. (Recommendation 7)

Any safety program, no matter how well intentioned and designed, still needs to be diligently followed. One cannot lose sight of the fact that contractors are in business to generate profits. Tendency to cut corners or casual attitudes may result in disastrous consequences. Con Edison needs to ensure that all safety requirements are tightly and strictly followed.

9. Overtime is consistently exceeding 20% over the past three years and does not appear to be under control. (Recommendations 1, 9, 10)

Con Edison's current overtime levels should be considered excessive and unacceptable. More importantly, it is reasonable to assume that the levels of overtime and management's inability to address this question suggest serious underlying issues. A root cause analysis of this problem is very likely to reveal significant improvement opportunities for the Company.

10. The external resource requisition procedures are effective in securing competitive pricing.

Con Edison's approach to using different types of contractors, namely, unit price, specialty, per diem and low level, to supplement its workforce is reasonable. The requisition process and bid check estimate process ensures competitive pricing.

11. The contractor workforces are generally efficient as there are many unit costing contractors and fixed price contractors. However, for better utilization of internal resources, resource analysis should be performed continuously at the local levels to levelize peak periods. (Recommendation 1)

There is little decision to be made for unit pricing work and specialty work. For better resource management and to avoid excessive use of per diem contractors, periodic resource analysis should be performed at the local levels to see if workload during peak periods can be leveled. The resource analysis also might reveal that it is more effective to expand the Con Edison workforce in lieu of consistent contractor cost growth.

12. Con Edison has no articulated strategy or specific policies on balancing in-house and contractor resources. (Recommendation 8)

Although case-by-case contracting decisions, despite a lack of stated guidelines, seem to be made on a logical basis, the lack of corporate-wide direction on a contracting strategy is a weakness. An optimized workforce requires a strategy for balancing resources, including specific definition of the role of contractors, management's desires for growth, stability or reduction of internal resources, cost trade-offs and overall objectives for using contractors.

13. The process of selecting supervisors assigned to oversee the contractors is sound. The process to fill the position externally when no employees in-house are determined by management to be qualified is also acceptable.

All the business units have procedures that lay out the requirements to oversee the contractors. There are also position guides, reviewed by Human Resources Department, that define the qualifications, education, and relevant work experience. It is also appropriate that the general manager will identify and ensure the personnel are qualified.

The same qualification and experience requirements apply to internal and external candidates. The company will go outside only if no qualified internal candidates applying on the posting are found. The same interview process is used for external candidates.

14. Low end work, such as traffic control, parking coordination services, and debris clean-up is appropriately outsourced.

All the business units have contracted out low end work when it is feasible and cost-effective to do so. The regional contracting groups or Construction Management ensured that competitive pricing are obtained.

15. The labor agreements with Local 1-2 and Local 3 provide sufficient flexibility and essential provisions for dynamic workforce management.

The labor agreements and work rules allow Con Edison to have a great flexibility and provisions to manage the physical work in an efficient manner.

4. Recommendations

1. Perform comprehensive resource analysis for all business units on a quarterly or semi-annual basis. (Conclusions 3, 5, 9, 11)

The procurement of a workforce planning model and the hiring of a workforce planning analyst are two steps in the right direction. Depending on the capability of this model, comprehensive analysis for all business units should be performed on a quarterly or semiannual basis to gain a complete understanding of the physical labor supply requirements at various skill levels. The analysis should take into consideration the five-year forecast of work demand, projected attritions, and anticipated job market environment.

This model should include a module of loaded labor manhour rates. Not only should this module contain all the Con Edison physical workforce average labor rates at the appropriate levels within each business unit, it should also contain the labor manhour unit cost of all the various types of outside contractors. Loaded rates mean the Con Edison manhour labor should be inclusive of all the departmental and corporate overheads and clearing items. Likewise, loaded contractor rates mean the additional overhead component to oversee and support the contractors should be included and monitored periodically.

One of the expected outcomes of the resource analysis is that the line organizations should be able to plan their resources to meet demands better and that overtime level will be more effectively controlled.

Also, the analysis on how GUWs are replenishing the retirees over the next five to seven years should allow the regional cost management analyst to assess how productivity and costs are to be impacted over the referenced time period.

Another expected outcome will be the lowering of the use of per diem contractors, as management will have a better understanding of the resource picture on the short and long term of labor supply versus demand, and thus, will be able to levelize and plan more efficiently.

Benefit: Better resource planning

Cost: (a) No incremental costs - already committed in the model and analyst; (b) support from business units should be part of regular work routines.

2. Assess and monitor the productivity and cost impacts of carrying an extra trainee on some work crews on a continuous basis to achieve more efficient resource management. (Conclusion 5)

The VEMO workforce planning model procured by Human Resource, when it is operational, will be a valuable tool for longer term resource planning. The planners and managers at the regional level still have to monitor and analyze the impact of carrying an extra GUW in some of their crews. They are more familiar with the workload requirements, the pending attrition, and the potential promotions/transfers. The extra cost of carrying an extra trainee will go on for a long while. Con Edison needs to position itself to be able to know if the problem is going to get worse and for how much longer. Having this knowledge will aid management to make prudent resource management decisions.

Benefit: More efficient workforce management

Cost: Nominal – should be able to incorporate into regular functions.

3. Conduct a root cause analysis of the upward trend in OSHA target rate in Gas Operations and prepare and implement a corrective action program. (Conclusion 7)

Adopt the root cause analysis technique to identify the underlying causes on the types of injuries with high occurrences. Then incorporate the findings and lessons learned into future training sessions.

Benefit: Employee safety

Cost: Should be accommodated in regular functions

4. Review the roles of management, the Board and/or its committees after serious events such as the 2008 electrical fatalities. (Conclusion 6)

In general, Con Edison's response to significant events is quite aggressive. This has not been the case in terms of the recent fatalities. Further, the avoidance of documentation, such as no investigation reports, and no visible action at the Board and executive level, may not send the best message.

Benefit: Addition of more visible support to safety initiatives

Cost: None.

5. Increase efforts to segregate safety from contractual issues in management / bargaining unit dialog. (Conclusion 6)

Safety should be the single issue where management and union interests best come together. Yet the contention from other issues has been allowed to hinder that effort.

Benefit: Improved safety results

Cost: None

6. Review safety targets with the objective of adapting "stretch," but attainable, levels that exceed historical averages. (Conclusion 6)

The current practice of using three or four year averages, even when the most recent year or two has been far better, is not an indication of a program striving for improvement.

Benefit: Improved safety focus

Cost: None.

7. Strengthen enforcement of contractor compliance with their safety programs.
(Conclusion 8)

Benefit: Contractor worker safety

Cost: Should be accommodated in regular supervisory functions.

8. Establish a corporate philosophy, policies and supporting guidelines for the balancing of in-house and contractor resources. *(Conclusion 12)*

Benefit: Cost savings from more effective use of internal resource and reduction in contracts

Cost: Should be accommodated in regular supervisory functions.

9. Establish a corporate philosophy, policies and supporting guidelines to provide managers and supervisors with a framework to manage overtime. *(Conclusion 9)*

A clear policy, starting with a “the less the better” presumption is necessary. Targets should also be established for reasonable levels of overtime, which will presumably be far lower than the current levels.

Benefit: Cost savings from more effective use of overtime

Cost: Should be accommodated in regular supervisory functions.

10. Prepare an analysis of corporate overtime expenditures that includes root causes of the upward trends and strategies for attaining more economic levels. *(Conclusion 9)*

Benefit: A target of at least a one third reduction in overtime will produce benefits in the millions of dollars.

Cost: A sophisticated effort is recommended, and that may require additional resources. The focus here needs to be the establishment of guidelines and training for managers and supervisors on how to optimize overtime. The result should not be a simple explanation of where overtime is spent, but rather an analysis on how patterns can be changed, work practices adjusted and planning improved to reduce overtime substantially.

D. Performance Measurement

1. Background

The performance of an organization is a function of a complex interrelationship between several criteria, such as effectiveness, efficiency, quality, productivity, quality of work life, innovation, profitability, etc. Our evaluation focuses on two: productivity and quality. Productivity is a relationship between input (work hours or labor costs) and output (work accomplished or service delivered). Quality is doing it right the first time. If the quality is poor, that means the work is not done right.

Measurement is an important management function. One cannot manage what one cannot monitor, and one cannot monitor what one cannot measure. The objective of measurement is not just to know how well you produce, but more importantly to pinpoint problems for corrective actions or to identify areas for improvement. In this section, we will evaluate the continuous improvement culture of the company, the quality control program, how the company collects quantities of physical work, and how productivity is being measured.

The criteria by which Liberty evaluated performance measurement included the following:

- A culture of continuous improvement should be in place that encourages management and employees to enhance work processes.
- An effective program of quality control should be in place that blends with the work flow and avoids checkpoints or delays that unnecessarily disrupt the work while also capturing defects early enough to minimize the need for extensive re-work.
- Physical quantities (for example, feet of conduit, number of transformers, yards of concrete) should be collected consistent with the WBS and directly linked to their associated installation costs.
- Productivity should be measured wherever practical and meaningful and compared to credible standards. Such measures should be on both a macro (collective) basis and micro (detailed tasks) basis. Definitive productivity standards should be cataloged for all standard work activities and specialized productivity standards designed for unique substantive tasks.

2. Findings

a. Continuous Improvement

i. Continuous Improvement Program

In the current world of great competitiveness, the degree of expectation is ever increasing and the bar of excellence is continually being raised. The issue is no longer whether a company is improving, but whether the company is improving fast enough. The only way to know the rate of improvement is to measure the performance. To the extent possible, performance improvements in terms of operation, safety, quality, schedule, reliability and productivity should be quantified.

“Improve Continuously” is one of the six core principles of The Way We Work. As described on the Con Edison website, *“In 2003, under the direction and leadership of appointed steering committees, teams within Con Edison began developing solutions to specific corporate culture issues and implementing new ideas that enhance open communication and measure continuous improvement. The employees were encouraged to embrace the concepts of The Way We Work principles and to realize that they were empowered to initiate changes that could improve the way work is performed on their own jobs and work activities. The six principles are:*

- *Plan the work and work the plan*
- *Seek and accept responsibility*
- *Communicate openly*

- *Work in teams*
- *Improve continuously*
- *Celebrate success.*“

A more defined explanation on the subject of Continuous Improvement is available on the Con Edison's Website under "The Way We Worked" Program as follows: *"Improve continuously is about efficiency and effectiveness or doing things both faster and better. Continuous improvement requires that we ask [why?] as often as we ask [how?] It's our commitment to assess, fix, improve, and eliminate; to demonstrate a standard of excellence in all areas of our business. It's also about the recognition that individuals are lifetime students and need to develop new skills, increase knowledge and vary experience to increase their value as employees."*

There is no question that many examples of improvements exist in the Company, and perhaps some of these flow from this statement of continuous improvement. Further, Liberty has seen improvements at Con Edison that represent an impressive effort on the part of individual employees. These demonstrate a level of initiative and innovation that has produced long-lasting savings.

But there is no evidence that the notion of continuous improvement, in any of its popular forms, is in place at Con Edison. The key words in the policy statement of "efficiency," "faster," "asking why" and "standard of excellence" have not been prevalent in the materials received in our research. In addition, we observe that the great majority of improvements cited by management are technical in nature and only a handful of the initiatives produce cost savings or direct benefits to the customers. And in those cases where such benefits may exist, they are not always adequately estimated or documented, suggesting that such benefits are not the primary purpose of such initiatives. This is not to denigrate those improvements in any way; but we are more concerned in this audit with improvements that increase productivity, eliminate unnecessary work and lower costs.

We also failed to detect the signs of a structured program. Specifically, employees may understand the desirability of continuous improvement but they seem unaware that such efforts fall under any defined policy or program or statement of intent by the Company. In this regard, there is a disconnect between management's understanding and the understanding evidenced by the workforce.

Liberty must note that extracting information from Con Edison on cost savings was not an easy task. The material that we received surfaced only after repeated questioning in the form of multiple interviews and data requests. Some of the Con Edison personnel simply did not appear to be comfortable or confident on this issue.

This should not detract from the good results achieved in many cases and especially the direct efforts of specific employees whose innovation produced real improvements. Their good work speaks for itself. We nevertheless conclude that cost savings or efficiency improvement is not really a focus of the continuous improvement process, which seems much more aligned towards technical improvements with any cost savings being generally serendipitous. This suggests the

need for an enhanced sensitivity to cost opportunities, which we believe will result from the holistic approach to cost management suggested earlier in this chapter.

b. Quality Assurance Program

The purpose of a Quality Assurance (QA) Program of any system is to maintain the safety and integrity of that system by ensuring that all the work practices and corrective actions comply with the established sets of processes, policies, procedures, or requirements. This is achieved through inspections and reviews. They can both be performed in-process or post-process.

All the business units have their own QA Departments and programs. The QA Department is responsible for conducting field inspections, performing quality assurance reviews, mitigating potential violations, and improving work practices to ensure that all the work performed is in compliance with Federal, State and City codes as well as internal operating procedures and specifications. For Construction Operations, the QA program additionally takes on performing inspections on construction projects and overseeing contractor performance.

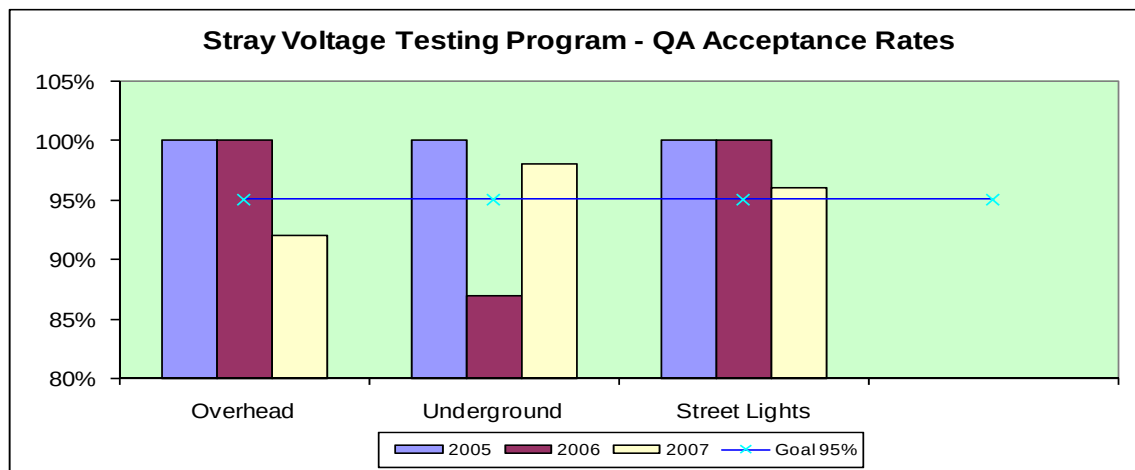
i. Quality Acceptance Rates

Each business unit has a different set of measurements regarding acceptance or failure rates. Some of the measurements are illustrated below:

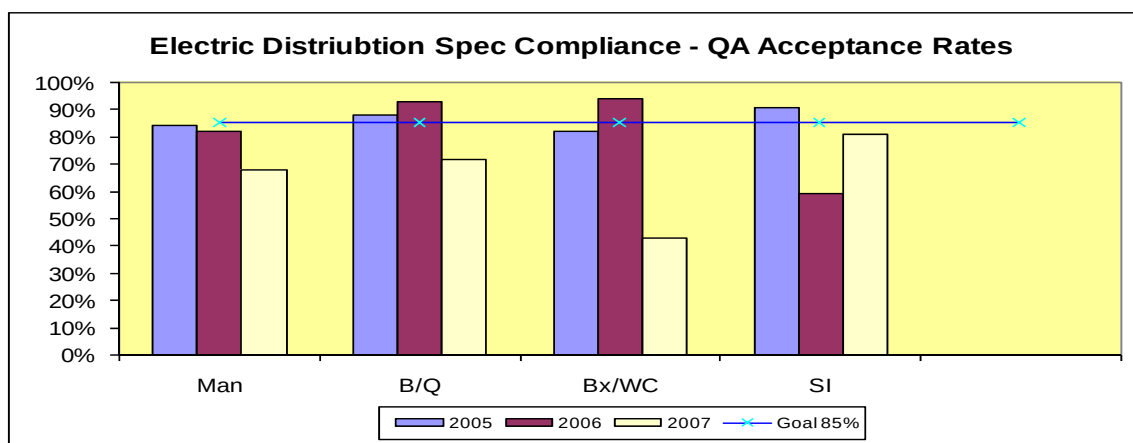
Electric Operations

Electric Operations created a five part QA KPI in 2006. The five parts were Stray Voltage Testing QA, UG Inspection QA, Specification Compliance, Operating Errors, and EH&S Field Inspections. The QA KPI was reworked in 2008 and pertains to Stray Voltage Testing QA, UG Inspection QA, and Specification Compliance.

For Stray Voltage Testing, the historical acceptance rates are generally around the target and in several cases are 100%. Several data points obviously beg the question, yet suitable responding analyses are not available.



For Electrical Distribution Spec Compliance, the acceptance rates vary widely and include results that strain credibility (such as the Bronx/Westchester 43%). Again, however, associated analyses are lacking.



Steam Operations

Two major functions that require QA attention are trap replacements and Weld Testing. The number of trap replacements and number of weld repairs indicated the QA rejection rates.

For trap replacement, the percent of replacement has doubled during the past two years, again without supporting analyses.

Table XII.8

Year	Number Inspected	Number Replaced	% Replacement
2003	6,019	446	7%
2004	6,591	490	7%
2005	6,783	567	8%
2006	7,145	528	7%
2007	7,493	1,309	17%
2008	6,305	813	13%

Non-destructive testing (NDT) is performed on all shop welds, while about one-third of the field welds are NDT tested during the year. The percent of field weld repair has started to increase again after trending down from 2003. The 2007 performance begs the question, again without analysis.

Table XII.9

Year	% Field Weld Repaired	% Shop Weld Repaired
2003	2.1%	1.0%
2004	1.3%	0.7%
2005	0.5%	0.7%
2006	1.5%	0.7%
2007	2.2%	1.6%

Construction Operations

Starting in 2006, the Construction organization selected 4 Performance Indicators related to Quality Assurance that are tracked annually.

Street Light Rework – This indicator measures the amount of street light repairs that are returned to Construction Services from the NYCDOT Street Lighting Bureau. The percentage rework performance indicator is calculated by the ratio of the "Validated DOT Returns" to the "Total Number of Street Lights Repairs" completed over a given month. "Validated DOT Returns" are repairs that were completed by Construction Services and deemed as an unacceptable repair by the DOT and is confirmed as such by a member of the Central Street Light group.

Year	Goal	Actual	Remark
2006	1.0%	0.6%	Goal met
2007	0.7%	0.2%	Goal met

Accuracy/Timeliness of Code 753 Mark – The Facilities Protection Group (FPG) provides oversight of 2 contractors that perform Code 753 mark out services for the company's underground facilities in response to an excavator generating a One Call Notification. FPG performs a QA field audit on a percentage of these mark outs to insure that they were marked on time (before start date of excavation) and accurately (no marks, mis-marks, quality). The field audit is either a visual observation, facility plate verification, or use of facility locating equipment that confirms all facilities are marked accurately and labeled correctly. It is expected that the vendors perform at a combined timeliness/accuracy rate.

Year	Goal	Actual	Remark
2006	98.5%	99.6%	Goal met
2007	99.0%	98.0%	Goal not met

Contractor Field Observation Report (CFOR) – Contractor performance is documented through internal audits or observations which are captured in the Company Contractor Oversight System (COS). The Contractor Oversight System is a corporate program used to both document the performance of contractors company-wide and to report and remediate performance problems. COS provides inspection forms or Contractor Field Observation Reports that are used by Company employees to document whether contractors, working for the Company, are performing within compliance parameters. The documented CFORs provide a daily look at the performance of the work force. Inspections are conducted to identify the compliance with rules, regulations and specification adherence. The Contractor Oversight Systems retains the field inspection reports (CFOR's) that were performed on the contractors hired by the Company to provide various services. While there is a goal for the number of CFOR's performed each year, there is no goal associated with an acceptance rate. Managers and Inspectors submitting the CFOR's are responsible for initiating further actions if there is a continued rate of failure in a contractor's performance.

Year	Goal	Actual	Remark
2006	16,500	28,567	Goal met
2007	21,670	22,739	Goal met

Stray Voltage Testing - The Facilities Protection Group is responsible for the field management and planning oversight for the Stray Voltage Programs for Electric Distribution since 2005. The role and responsibility is to ensure that the contractors performing stray voltage testing perform this testing on all structures annually, correctly and safely. The indicator that is tracked is to test every structure on the Con Edison system each year. As part of this oversight, Facilities Protection is responsible to audit these programs for quality assurance. QA criteria have been established for these programs. These programs include: manual testing of Underground, Street Light and Overhead, Mobile Detection Testing, and Site Safety.

Year	Goal	Actual	Remark
2006	726,939	757,302	Goal met
2007	733,586	733,586	Goal met

ii. QA Inspector Qualifications

The Quality Assurance program is the last lines of defense to ensure safe and high quality work. The business units all demand a high set of skills and diversified experiences. The qualifications are summarized as follows:

Electric Operations

The Electric Operations Quality Assurance Section is comprised of two groups – the Review Group and the Inspection Group.

The Review group looks at processes to determine whether they are working effectively and how they can be improved. The qualifications of this group include a minimum of 3 - 5 years experience in the design, construction, repair and inspection of Overhead, Underground, Instrumentation & Apparatus, and/or URD Electric distribution systems. All of the QA Reviewers have between 4 and 35 years of experience at Con Edison in Substations, Cable, Equipment, Underground Splicing, etc.

The Inspection Group is comprised of Union/Management teams. All these personnel have worked through the ranks and have minimum of 5-years experience in their craft such as Overhead Line Construction, Installation & Apparatus Networks, and Underground Splicing.

Gas Operations

Members of the Gas Operations Quality Assurance group must have extensive knowledge of the gas business and/or gas field operations. They also should have a strong working knowledge of Gas Operations procedures; corporate policies and procedures; State (PSC) Code; and Federal DOT regulations relating to Gas Pipeline Safety. The current staff all have Bachelors degrees. Their experiences in gas operations vary from 17 years to 35 years.

Steam Operations

Distribution - three to five years knowledge or experience with the installation, maintenance, and repair of Steam Distribution main, service, and customer piping systems; BS.. degree in Engineering, or equivalent experience; knowledge or experience in instrumentation and control systems, computers, and procedural writing; NYC/NYS Asbestos Supervisor and NYS Inspector certification as well as ICS qualifications.

Generation - three to five years of experience in power/steam generation; B.S. degree in Engineering, or equivalent experience; knowledge of power plant thermodynamics, energy conversion, combustion, heat balance, fluid flow, boiler water chemistry, water treatment, and vibration analysis.

Construction Operations

All construction inspection personnel receive a core training program of at least 50 days that can vary in content depending on the type of activity they are responsible for overseeing. In addition, annual refresher training is also provided for certain types of work. Inspectors are required to have 3-5 years of experience in construction operations to apply for a position and then go through a series of test/interviews before they are selected to the position. The training programs can take up to 3 years to complete and also include a number of “on the job” assignments and exercises to round out their experience.

iii. QA/QC Inspector Headcounts

The historical headcounts of dedicated QA inspectors (or full time equivalent):

Business Unit	2003	2004	2005	2006	2007
Electric Operations	12	12	12	12	25
Gas Operations	9	9	7	7	7
Steam Operations **	0	0	0	0	0
Construction	224	236	233	252	256

** All operating supervisors in the course of their daily activities review worker and job quality. They perform QA inspection and review functions, as required.

c. Physical Quantity Collection

During the annual budgeting cycle, work volumes are forecasted by determining requirements to meet major objectives of each department. The major objectives are determined by PSC mandated work, work volumes, and programs established in the current rate case. Some work volumes are determined using three to five year historical trends, normalizing out any major events.

To properly monitor the performance of the workforce, it is crucial that the installed quantities are collected consistent with the work breakdown structure and directly linked to their associated installation costs.

Other than the major capital and O&M projects, all business units manage their work by volume and unit productivity as much as practical. The following tables summarize approximately the work accounts that are being measured in the collection systems.

Business Units	Capital	O&M
Electric Operations	80	150
Gas Operations	110	250
Steam Operations	---	40

To get an idea on the magnitude and volume of the historical data available, listed below are the available quantity data for some of the major accounts within each business unit. Such information is valuable when used with work hour data to analyze workforce productivity.

Electric Operations:

O&M Account Description	2003	2004	2005	2006	2007
UG Lines – ground & phase – Identify	24,826	27,234	26,316	30,590	31,273
Maint-UG Lines – Burnouts – Feeders	4,869	6,348	6,215	4,841	3,802
OH Lines-Remove/Reset Transformer	17,180	19,682	22,250	22,522	19,162
UG - Insp Prog – Manhole Repair	13,835	7,393	22,598	18,738	12,398
Maint-Street Lighting Defects – UG	4,637	4,362	4,538	3,881	4,743
Maint-OH Cond & Dev - Emergencies	5,787	4,849	6,369	9,655	5,262

Gas Operations:

Capital Function Description	2003	2004	2005	2006	2007
New Business – Services	2,992	2,921	3,121	3,276	3,026
New Business – Main	65,595	32,106	51,828	41,849	32,375
Meter Installation	20,252	18,440	26,506	24,284	26,117
Leaking Services	2,918	2,650	2,122	2,177	2,275
Corroded Mains (in footage)	122,451	77,267	67,630	59,909	62,821
Medium Pres. Cast Iron Main (in ft)	27,293	6,689	22,532	3,054	---

Steam Operations:

Account Description	2003	2004	2005	2006	2007
Trap Inspection	6,068	6,634	6,809	7,153	7,500
Slip Joint Inspection	2,123	2,328	2,605	2,840	2,562
Manhole Inspection	3,077	3,443	4,229	4,858	4,146
Pump Repairs	69	94	47	139	140
Trap Repairs	722	756	912	957	828
Calls/Investigation	1,537	2,677	3,459	3,541	3,777
Turnoff/on Main Valves	416	428	430	437	416
Replace Defective Traps	809	704	1,138	1,312	1,314
Replace Meters - Shuntflo & Vortex	977	810	579	699	756
Repair/Replace Regulator Valves	492	677	635	646	568
Turn On/Off - Service Valves	3,911	3,832	3,812	4,566	3,820
Turn On/Off - Seasonal Valves	810	689	761	759	841
Calls/Investigations/ responses	2,875	4,505	5,027	4,656	3,747

d. Productivity Measurements

i. Productivity Measurement

The primary objective of measuring productivity is to improve performance. Measurement provides management with new insights into why the workforce performs the way it does, whether it is meeting expectations, where it can be improved, or when the performance is out of control. More importantly, measurement is not for knowledge, but for action. Measurement should prompt management interventions when course correction is required or when productivity barrier needs to be removed.

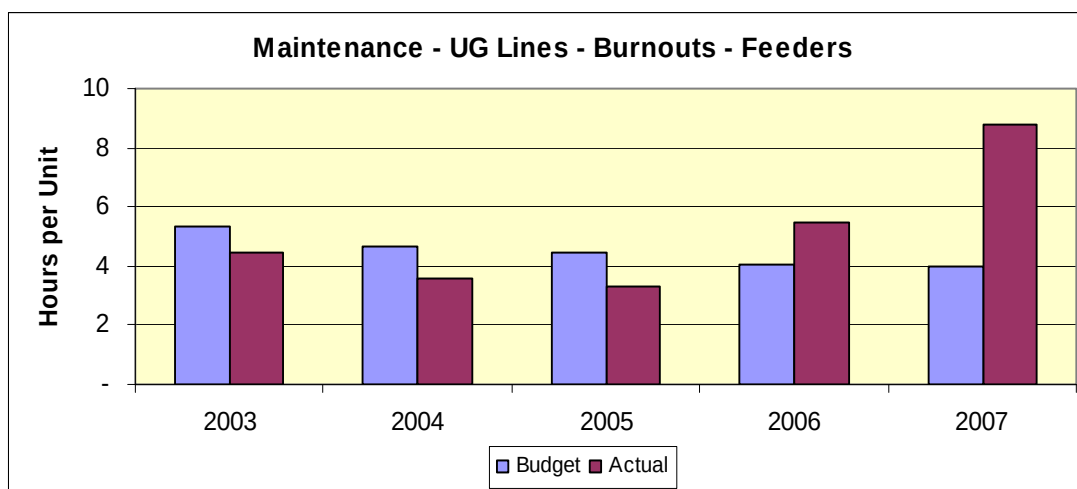
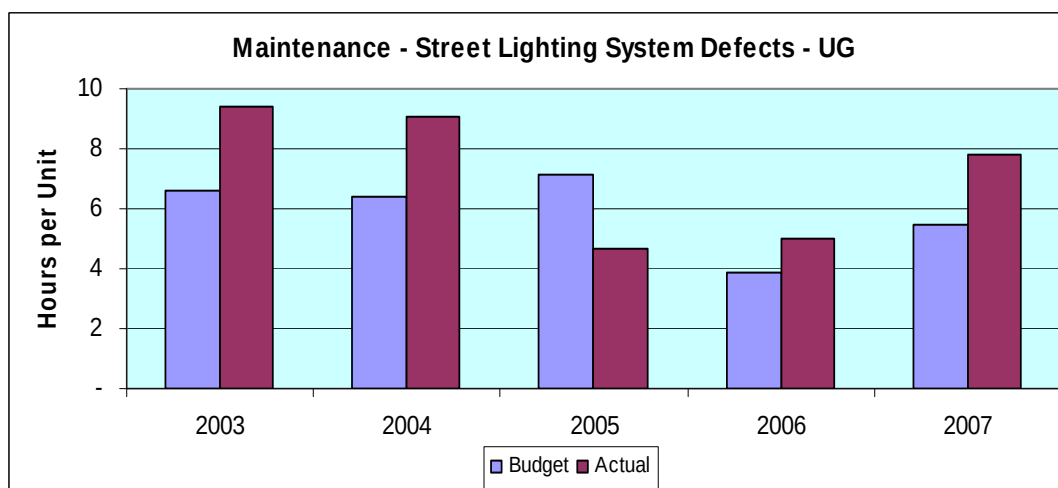
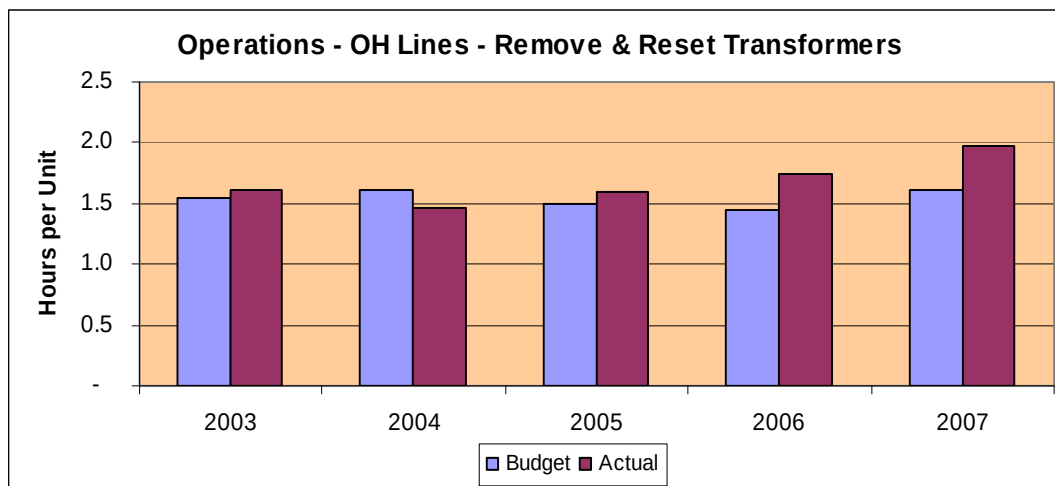
Each business unit in Con Edison uses different tools to measure its productivity. A brief description of the measurement systems are summarized below. With plenty of historical data available at the work unit level, analysis of the trends can offer some interesting insights.

Electric Operations

The Division Operations Control System (DOCS) is an on-line IMS system designed to monitor the amount and status of work to be done, and to provide performance analysis of work completed, in the Operating Regions. All work control functions are performed on-line so that the status of work records in the system is as accurate and complete as possible. Work control and monitoring is performed by defining work to be done in terms of a standard work function, called a Work Unit. Each work unit describes a specific function to be performed. This description is used to create real work to be done, by associating the work unit with a location at which the work is to be performed, a required date of completion, and the number of times the function must be performed to accomplish the goal. Work that has been so defined is called an Associated Work Unit (AWU). Work Unit Analysis Summary Report can be generated by comparing performance to unit standard rate for each work unit worked. A Performance Index is calculated using an earned manhour method for each work unit at the individual, supervisory, and managerial level.

Reasonable Expectancy (RE) rates are productivity rates developed during the budgeting processes using current year and previous three years' actual performance data. During the year, the productivity of the Capital and O&M functional categories are managed by monitoring the actual unit productivity rates. The O&M Budget-Hours Per Unit Summary Reports and PRANO (Property Record Asset No.) Capital Budget Hour Per Unit Reports are generated at the regional level as well as the organizational level.

The following three charts have one common trend. The actual unit rates all started to trend upward starting in 2005. Our discovery process failed to uncover any analyses of these trends.

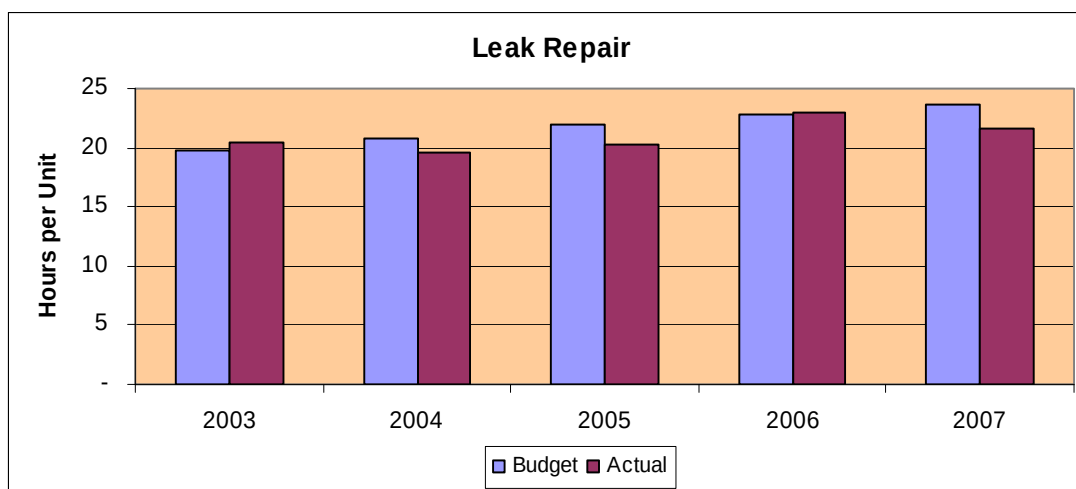


Gas Operations

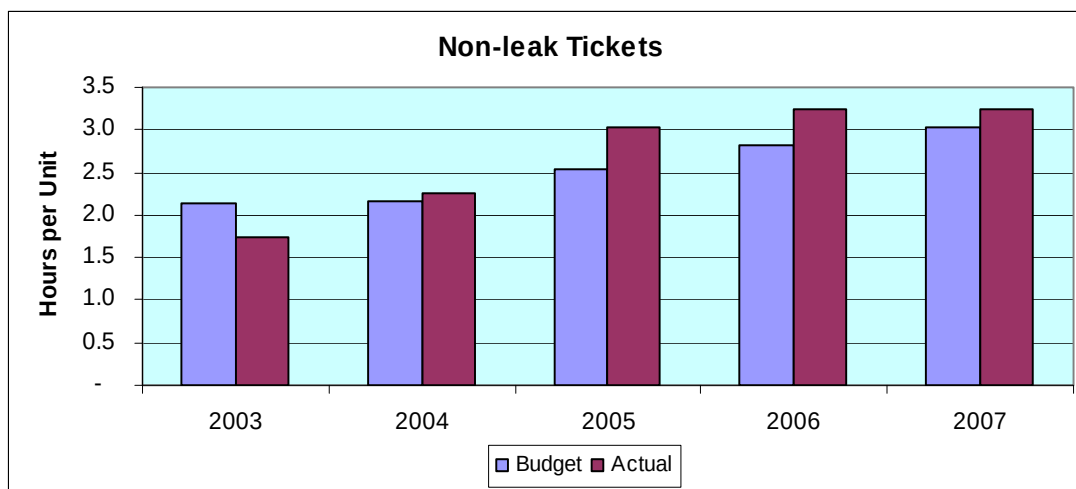
Gas Operations generated productivity measurement reports by combining information from several sources: the total expenditures (reported using the Cost Analysis Reporting Environment, or CARE, Program), total hours (from CARE) and units of work (from Emergency Control Systems or ECS and GASOPS) by functional categories in Gas Construction, Gas Distribution, capital and Technical Operations. Using this data, Gas Operations calculates the total cost per unit and hours per unit where company employees and per diem contractors are used on a monthly and year-to-date basis. Reports utilized by area Gas Operations departments to track work units, labor hours, and other expenditures are described below:

- **COGNOS** - The report tracks the expenditures, hours, and units of work for each functional category within Gas Operations for a chosen time period. The report parameters can be modified to include unit costs, groupings of two or more organizations within Gas, and expenditures broken into element of expense.
- **Direct Labor Hours System** - Report is used to track the hours worked by a particular organization, department or section within Gas Operations on a weekly, monthly and year-to-date basis. Parameters of the report are able to show the various account numbers charged, overtime hours, straight time hours, and non-productive hours worked.
- **Accrual Account Detail w/ Summary** - Report provides the specific jobs being performed by Gas Operations turnkey contractors that are supervised by Construction Management. Provides a total job cost estimate, percentage complete, accrual amount and account number charged.
- **Query Management Facility (QMF) - Weekly Unit Report** - Provides detailed information on all units of work completed within a provided time period. Provides location, Gas ticket number, trouble type, facility and work performed.
- **Ticket Labor Status report** - Provides all hours charged to a given Gas ticket number. Lists number of hours, employee, date of work, and account number.
- **Leak Repairs per Ticket** - Number of leak repairs recorded per leak ticket worked.

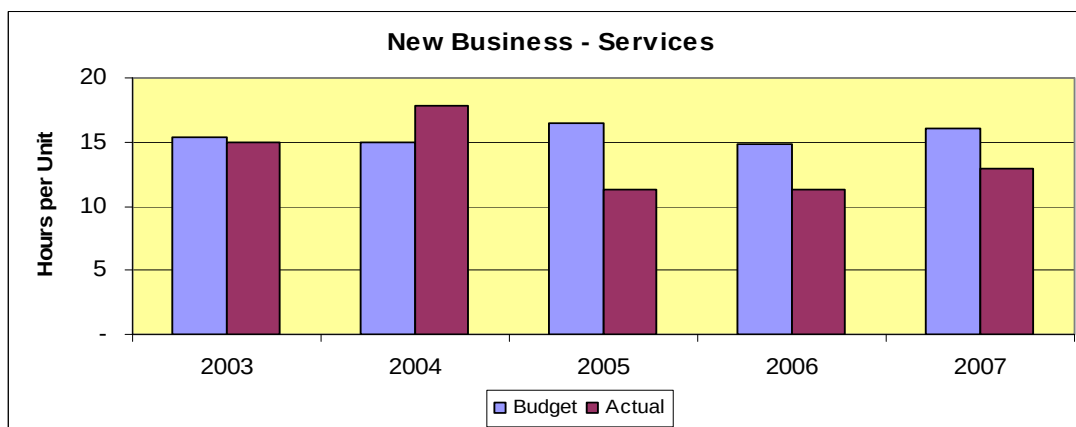
Leak Repair is one of the heaviest work load items. Con Edison has a pretty stable performance in providing this service to its customers all through the years.



Non-leak tickets are a different story. The unit rate has steadily doubled from 1.6 work hour/ticket to 3.2 hours/ticket over the past five years. The root-cause needs to be understood.



The data indicates that the performance on New Business – Services has been consistently good.



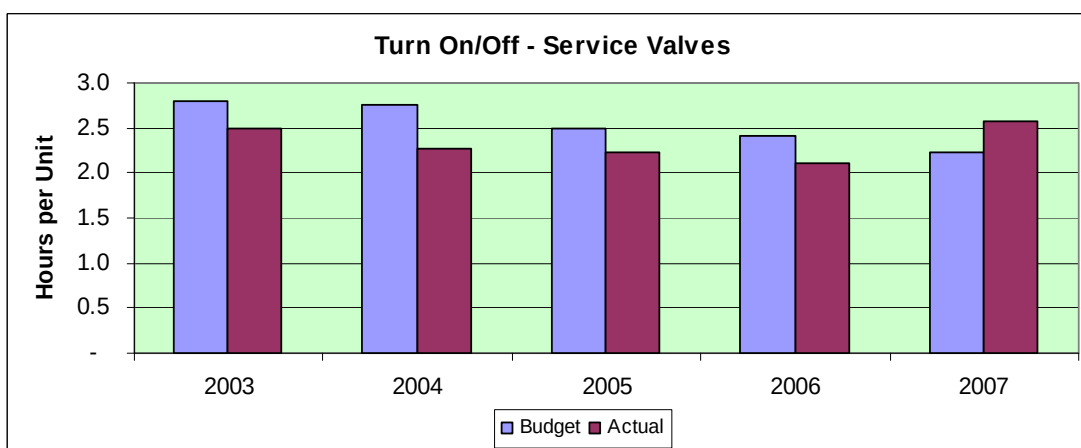
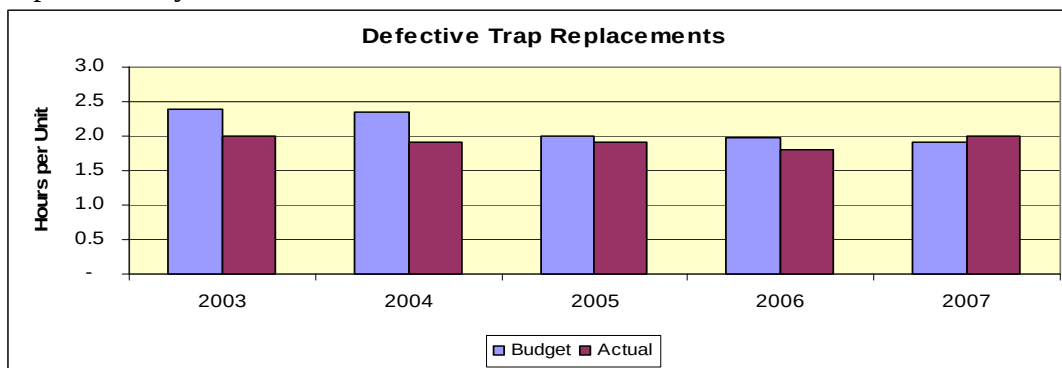
Steam Operations

Steam Production uses MAXIMO for work management and productivity measurement. Work orders are generated for planned preventive maintenance as well as emergent corrective maintenance work. Actual work hours and completed work tasks are entered in MAXIMO, which is used to generate reports to compare actual productivity rates to established standards. If significant deviations are identified, corrective actions are communicated to the appropriate field planner or supervisor for implementation.

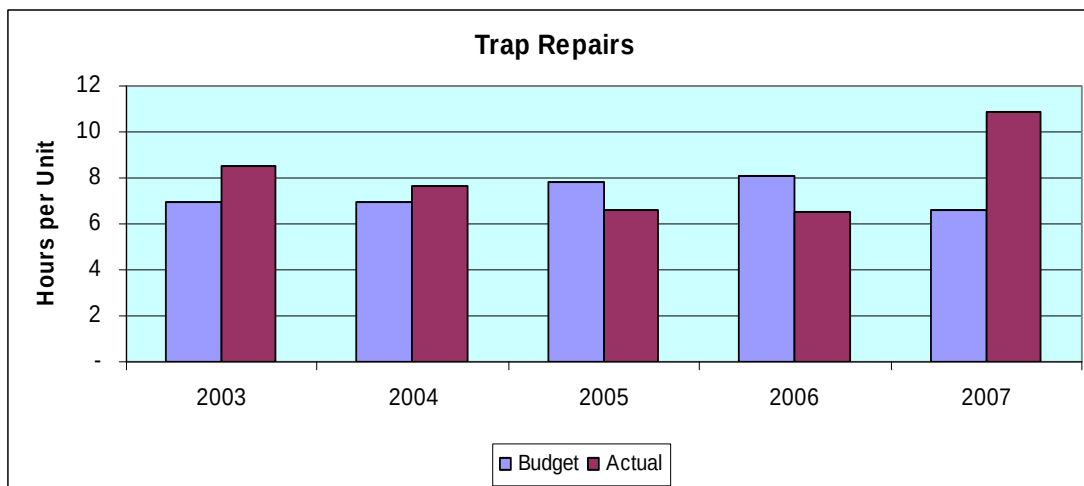
Steam Distribution utilizes Steam Operations Mapping and Information System (SOMIS) as its work management and productivity measurement tool. All field operation work is tracked and unitized. All steam distribution work is tracked from origination through completion in this System. When work is completed, the data is entered into SOMIS on a daily basis. In addition, SOMIS and DOCS are utilized to capture labor and time charges for each job. This enables actual labor charges for a particular task to be compared against established standards. If

significant deviations are identified, corrective actions to improve are communicated to the appropriate field planner or supervisor for implementation.

The following two charts illustrated that even though in 2007 the actual finally overran the budget, the performance was commendable as the budget bar had been lowered each year since 2003 to challenge the favorable actual. That is the right way to use the measurement system to improve productivity.



All three charts indicated actual unit rates increased in 2007. The year-end productivity reports show that the unit rates for most of the accounts with heavy volume also increased.



Construction Services

Construction Services (CS) uses the Unit Cost Report (UCR) to track productivity. Since CS charges back all its costs to the user groups, the main objective of this report is to ensure CS is aligned with the systems being used by its internal customers. The UCR is a stand-alone spreadsheet developed by CS. The report is front loaded with descriptions of work (items), planned number of units to be completed by year-end and an estimate for each unit. The estimated hours required for each description of work come from the Planning and Analyst bid check estimate section. The field groups then populate the weekly report with the number of units completed each week and the man hours used to complete the respective items. The UCR report helps determine the effectiveness of the field forces and also provides the managers with data that will help them identify potential deficiencies in terms of productivity. The expectation for productivity is to be within 10% of the estimate. If the number is within 10%, the expectation is being satisfied. If the number is above the 10% range, it generates internal discussion to determine possible causes.

ii. Benchmarking

Although benchmarking has lost much of the momentum it gained in the 80s and 90s, it is still a popular and valuable management tool. It is often confused with data comparisons, which might be characterized as “the poor man’s benchmarking” in that such comparisons are much simpler and far less effective.

While benchmarking might begin with a comparative analysis among different organizations (externally or internally), its key ingredients are a search for best practices, how those best practices translate into lower costs, and how (and if) those successes can be transplanted to other organizations. Effective benchmarking therefore carries a high process analysis component and is by no means a simple, or cheap, endeavor.

In general, we conclude that Con Edison is not a major proponent of benchmarking. The prevailing thinking is that the Company is so unique that the practices of others are not applicable and apples-to-apples comparisons are not even possible. There is indeed an element of truth here, but such a generalization closes the door to some real opportunities.

The degrees of involvement in external data sharing efforts vary among the different business units as follows:

Electric Operations

Participated one time with PA Consulting Group in 2007 (comparing 2006 data)

Started to participate in the Public Service Electric & Gas Peer Panel this year (data not yet available). The following information should be available when the annual report is issued:

- Employee Satisfaction – OSHA index, OSHA severity rate, vehicle accident/million miles driven, average days absent per employee
- System reliability (excluding storms) – CAIDI, SAIFI, MAIFI
- Electric Construction - capital cost per existing primary mile, capital cost per Mw/hr sold, substation \$ per existing customer
- Electric Operating and Maintenance – O&M cost per existing primary mile, O&M cost per Mw/hr sold, pole inspection cost per unit

Gas Operations

Con Edison has been a long-term participant in the American Gas Association (AGA) Best Practices Benchmarking Programs for Gas Distribution, Gas Transmission, and Liquefied Natural Gas (LNG).

Steam Operations

Con Edison is a member of the International District Energy Association (IDEA), the trade association for the district energy industry. IDEA provides a forum for district energy professionals to exchange information on regular and timely basis. The association holds a major conference and trade show and three to six other conferences or workshops annually. Con Edison employees are regular participants and presenters at IDEA conferences and use this organization for external benchmarking activities. In addition, Con Edison Steam Operations hosts periodic meetings on a lesser scale with other district energy companies, such as Tokyo Gas, NRG Energy, and Trigen Energy, for the purpose of benchmarking.

Construction Operations

None.

3. Conclusions

1. The assessment of cost savings or cost avoidance on continuous improvement initiatives is inadequate. (Recommendation 1)

Most of the continuous improvement initiatives focus on the technical benefits and implementation costs. Cost savings or cost avoidance is not generally a motivation and hence estimates of savings are not a standard practice.

2. There is a disconnect in the perception of a continuous improvement culture between the senior management and the working level personnel. (Recommendation 1)

In our discussions in meetings with upper management and interviews conducted with field personnel, there is a significant difference in the understanding of what the culture of continuous

improvement means. Having some continuous improvement activities does not necessarily mean there is a culture, nor does it imply a structured program or defined process. Some of the improvement examples are borne out of necessity or in response to a problem at hand. A true improvement culture exists when people are actively looking for ways to improve and are cognizant that any cost in the proposal should be offset by resulting savings. Discussions with working personnel failed to reveal any such broad-based tendencies and employees seemed generally unaware of any organized effort or priority for continuous improvement.

3. None of the business units has productivity as a pay-for-performance goal.
(Recommendation 2)

One can reasonably interpret this as an indication that productivity is not considered to be a priority performance area and/or that the work groups were not confident in their ability to manage productivity. In either case, this is a serious gap, especially in light of the many excellent productivity monitoring tools available to Con Edison managers.

4. There is little documentation on the implementation and effectiveness of lessons learned. *(Recommendation 3)*

During the interviews, there were many discussions about sharing of lessons learned, but very little documentation. The inability to offer anything more than anecdotal evidence of advances from lessons learned suggests that such efforts may not be as effective as currently believed within the Company.

5. The Quality Assurance Program is effective. However, the QA acceptance rates are trending poorly. *(Recommendation 5)*

All the business units have good Quality Assurance programs. The processes are effective. The QA inspectors have appropriate qualifications and experience. Rework has not become a significant problem, but the QA acceptance rates in some cases are trending poorly. Electric Operations has to focus specifically on spec compliance, as the chart has shown serious deterioration during the past year.

6. The collection of production data is sound and consistent.

Collection of quantity data is consistent with the work breakdown structures. Quantities of measurable items are properly linked to installation costs. Collection systems effectively integrate quantities with manhour expenditures for performance measurements.

7. The Work Unit Rates are firmly established and are consistently being used to gauge performance at the business unit, regional, and individual levels.

The work unit rates are well established. There is a wealth of historical information. The approach to develop Reasonable Expectancy rates based on history is reasonable.

8. Analysis of cost variances is inadequate.

Our test of the effectiveness of analysis is “the extent to which such analysis precipitates and facilitates corrective action”. Any analysis provided by Con Edison personnel can be substantially improved under this standard. However, in most cases, there simply is no analysis

at all, effective or otherwise. Additional supporting recommendations for such an initiative are provided under “Cost Management.”

9. There is no substantive effort at internal benchmarking. *(Recommendation 3)*

Con Edison collects a large volume of historical productivity information, but no quantitative analyses follows. Presently, there is some sharing of information based on qualitative assessments.

10. There is limited participation in external data sharing and less in external benchmarking. *(Recommendation 4)*

It is easy for some managers to hold the opinion that Con Edison is operating in such a unique environment that it will be misleading to compare its performance to any other utility companies. Benchmarking is not data comparison. Data comparison by itself has very little value. Benchmarking is the process of examining the data in order to identify the company with the best practices. That best practice may or may not be entirely applicable to a company. It is the opportunity to extract fresh ideas, to network with professionals in the same industry and to learn from any success stories.

4. Recommendations

1. Advance the continuous improvement efforts under The Way We Work program.
(Conclusions 1, 2)

There are two main issues to address in this recommendation. First, does the Company really want to implement a continuous improvement initiative? We speculate that the answer might be “yes, and we believe we have done so.” We have noted however that employees do not have this message. So, to the extent a program is desired, it needs to be structured, communicated, supported and implemented.

Continuous improvement was not so long ago the most popular management initiative. Accordingly, a wealth of information, including structured programs, training materials, lessons learned and willing consultants, is available. It should not be overly difficult to both raise the profile and the effectiveness of the Con Edison initiative. One essential element will be the assignment of a suitable level of internal personnel and perhaps a program “czar” or subject matter expert (SME).

Second, any such program needs to have a focus on cost. “Improvement” can be a much-abused term and it is the degree of savings to be achieved that can ground the program in reality. We therefore recommend that Con Edison’s expanded program have clearly defined cost priorities, with a stated objective of cost savings, a requirement for cost analysis of all proposed changes and recognition of the tangible savings produced by employees.

Benefit: A new source of cost savings and productivity gains; an enhanced improvement culture; heightened cost awareness and sensitivity

Cost: One dedicated managerial position - \$150,000 per year, plus programmatic costs, perhaps \$500,000.

2. Include pertinent productivity improvement goals in future KPIs at various management levels. (Conclusion 3)

The cost of work crews represents one of Con Edison's biggest cost components. Productivity improvement should therefore be a high priority. Success should be tied directly to the compensation at all levels of the organization from supervisor to the executive level.

Benefit: Better focus and visibility on productivity improvement

Cost: Nominal – should be able to incorporate into regular activities.

3. Implement a formal program for representatives from each region to share lessons learned in their respective fields. (Conclusions 4, 9)

Appoint a general manager as a sponsor and select representatives from each region to meet on a quarterly basis to share lessons learned in their perspective fields. The program should document if the lessons learned will be adopted and implemented in other regions. Cost savings or cost avoidance should be quantified whenever possible.

We also recommend a more structured Lessons Learned Report. The purpose of such report is to bring together any lessons learned, both positive and negative, during the course of the year that can be usefully applied to other similar area of work. This practice has been done formally at the conclusion of some major projects, and informally during some regional meetings. The Lessons Learned Report should contain:

- Evaluation of which management and quality processes went well, went badly, or were lacking.
- Description of any abnormal events causing deviations from plans.
- Assessment of all the technical methods and tools used.
- List of all the successful measures in taking timely corrective actions, including the reasons why they worked well.
- List of all the lost opportunities for failing to recognize deviations.
- List of all the corrective actions taken that turned out to be ineffective, including why the attempts failed.
- Recommendations for future enhancement in any work management areas.

Benefit: More concentrated effort on implementation of continuous improvement initiatives and better focus on cost savings.

Cost: Nominal – could be incorporated into quarterly meeting or The Way We Work program

4. Participate more actively in external information sharing efforts. (Conclusion 10)

For Electric Operations, designate a few planners to participate in Electric Utility Cost Group (EUCG) and Public Electric & Gas (PSE&G) Peer Panel. For Gas Operations, continue to participate in American Gas Association benchmarking effort, and also participate in the PSE&G Peer Panel.

Benefit: (1) Employee development; (2) networking with industry peer professionals, exchanging continuous improvement ideas, and identifying relevant best practices for implementation.

Cost: Minimal.

5. Perform analysis on work items with unacceptable QA rejection rates to isolate performance problems. (Conclusion 5)

Analysis should be performed in all regions by business unit. Future QA rejection rates should also be monitored to see if corrective actions recommended are effectively implemented.

Benefit: Productivity improvement

Cost: Should be able to incorporate into regular activities.

***Project Management - Electric
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XIII. Project Management - Electric

A. Introduction

This chapter examines the CECONY electric business's project management programs and activities. The capital budget has grown to over \$2 billion per year, an immense amount of physical work by any standard. The central question this growth in work compels is whether the Company's management capabilities and tools have grown with the size of the capital budget. That fundamental question formed the primary basis of the examination Liberty performed.

Two major organizations manage electric construction efforts; the nature of their work and their approach to project management differ. The chapter therefore discusses each organization in separate sections. In general, the first organization, Central Operations, operates very effectively in its approach to project management. We will describe many initiatives this organization has taken to elevate skills, programs and capabilities to meet the heightened challenges of a massive capital program. We will suggest that a more effective approach to resource planning will further help Central Operations, as will an expansion of their project management efforts into the management of ongoing programs.

The nature of the work in the second organization, Electric Operations, in some cases may not lend itself to project management approaches to the same degree as Central Operations. However, Liberty believes that CECONY is missing a significant opportunity. The principles of project management are indeed applicable in most elements of the work; however, Liberty found a lack of sufficient employment of such principles in Electric Operations. Examples include comparatively weak project management efforts, a lack of dedicated project managers, inconsistency among the regions, a lack of strong cost management, and weak scope control.

In general, Liberty believes a strong foundation exists in the Company for effective project management. CECONY can achieve real savings by building on that foundation for improved programs in Electric Operations. Coupled with a strengthened approach to cost management, Liberty is optimistic that the Company can make real gains through the use of more effective project management programs and methods.

1. Background

Project management is perhaps the most structured element of this audit. The standards applicable to its practice are better defined and more universally accepted than is the case for other audit elements. It lends itself to academic considerations; much has been published about how to do it right. However, there is also a softer side to project management -- one more correctly characterized as art than science. Because project management, by definition, spans many "silos," it has a large people-component.

Firms requiring large investments in plant, like utilities, by necessity have developed their own approaches to project management. Some projects can at times lend themselves to "turn-key" efforts by contractors; however, they comprise the exception, not the rule. Project management is too important for the typical utility to delegate; therefore large utilities all have dedicated programs of project management, although they vary in approach, sophistication, and quality.

The fundamental notion behind project management in a utility is the coordination and management of multiple organizations for the completion of significant cross-functional endeavors. The necessity to manage work that spans numerous organizations requires a cross-functional approach; *i.e.*, one that forms the foundation for project management.

Project management programs come in many variations, but should all include a number of standard components to meet key requirements. These components include scope, schedule, quality, cost, risk, resources, safety, procurement, and communications. An effective program will contain all of these elements and perhaps more, but three always emerge as the bottom line objectives: cost, schedule and quality. The balancing of these three parameters presents the principal challenge to the skill of project managers.

2. Evaluation Criteria

Liberty's review of project management centered on a series of evaluation criteria developed to reflect generally accepted approaches to project management.

a. Project Management Process Structure

- A project management program should exist to address all elements of project management, and be targeted at appropriate cross-functional projects.
- The team of project managers should have experience in all elements of project management, and have suitable credibility within the necessary work processes.
- Large projects should be provided with dedicated support resources, including planning, scheduling, and cost engineering skills.
- Project management principles should also be applied to significant O&M efforts requiring cross-functional participation.
- Formal approval and kick-off of projects should not be permitted in the absence of reasonably firm scope definition and a cost estimate whose quality is consistent with the current design status.

b. Project Management Knowledge Areas

- The goals, principles, and methods of cost management described in further detail in Chapter XII; *Work Management* should be applied, including the holistic approach, appropriate systems, measures, analysis, reports and corrective action requirements.
- Major components of the work should have their own tailored "cost management plan" that describes the baseline cost, who is accountable and how costs will be managed. Such plans should include the specific actions required of the cost manager and the supporting cost engineer.
- Large projects should contain "exit ramps" early in the job to permit management re-consideration if costs begin to escalate.
- A program of scope control should identify scope deviations early, require analysis of such deviations, and mandate the specification of alternates to mitigate the effects of deviations.

- The role of quality and its relationship to cost and schedule achievement should be clearly defined and understood by all project participants.
- A process for the handling of contingencies should be defined and the “owner” of budgeted contingency funds for purposes of funding approvals should be identified.
- Project management principles that define requirements for contractor project management programs on “turn-key” projects should be in force.

c. Organizational Culture and Capabilities

- The role and responsibility of the project manager should be clearly defined and understood throughout the organization.
- Expectations for project managers should be consistent with the authority and resources given the project manager.
- Project management requirements for project participants should be generally consistent across all projects.
- There should be a clear linkage between project management and the budgeting systems, characterized by input from and feedback to those systems.
- The relative priority of projects and programs should be defined in the planning and budgeting process and, once projects have been approved, assigned and scheduled, those priorities should be moot (*i.e.*, the project manager should not have to compete for resources).

d. Project Management Applied to Program Management

- The construction program should have provisions for the collective management of small projects, as opposed to the standard project management approach.
- The project management program should apply to all organizations participating in a project, whether CECONY or contractors.

3. Activities

Liberty undertook the following key activities in evaluating CECONY’s work against the evaluation criteria:

- Evaluated CECONY’s approach to project management, including the PM approach (weak or strong), applicable projects and organizational dynamics.
- Evaluated the quality of the project management and support organizations, including the skills and experience of the key incumbents.
- Evaluated the degree of support given project managers and its consistency with the expectations for project managers.
- Tested the relationships among project managers and the functional organizations and the degree to which the organizations support and are supported by the project manager.
- Evaluated the cost management systems in use for projects and the effectiveness of their utilization by the project managers and the functional organizations.
- Evaluated the quality systems in use for projects and the effectiveness of their utilization by the project managers and the functional organizations.
- Evaluated the schedule management systems in use for projects and the effectiveness of their utilization by the project managers and the functional organizations.

- Evaluated project management expectations and performance in other critical project elements, including safety, procurement, materials management, communications, contractor interfaces, labor relations, HR, bookkeeping and administration.
- Prepared at least three case studies of actual projects (one <25 percent complete, one in mid-stage and one complete) and determine how project management systems have worked, where opportunities have been taken or missed, and where improvements may be possible. Determine the degree to which the case studies are representative of broad project management performance.
- Evaluated how projects are initially prioritized and then slotted in the budget, and the impact of this decision on subsequent execution.
- Evaluated how initial scope is defined, including its credibility, relative “sanctity” and its ability to serve as a good baseline for control. Determine if there are any propensities to approve and start projects without sound baselines for control.
- Determined the degree to which mechanisms exist to stop, re-consider and, if appropriate, cancel projects that exhibit early out-of-control tendencies. Examine the triggers to alert management to the need for such a re-consideration.
- Evaluated how the balance of the construction program (i.e., those projects that do not come under a project management approach) are managed.
- Evaluated how contractors are managed within the context of the project management program, including those with turn-key responsibilities.
- Determined how CECONY project managers are expected to balance cost, schedule and quality, among other priorities, and what guidelines, training, policies or other aids exist to help meet this challenge.
- Evaluated how project managers maintain conformance to the project’s “intent” with the restraints experienced in day-to-day management (budgets, scope changes, contingencies, design errors, etc.). How is the project manager’s ability to stay true to the intent monitored?
- Evaluated the flow of projects from the budgeting process into the project management jurisdiction, including how project budgets are then set (in relation to what is in the capital or O&M budget) and how design intent is maintained.

B. Central Operations

1. Background

Central Operations has responsibility for planning, engineering, constructing, operating and maintaining electric substations and transmission for both electric and steam. For the electric substation and transmission functions within CECONY, the groups shown below are the primary departments involved in the process of engineering, construction and maintenance.

Electric Substation and Transmission Functions: Primary Engineering, Construction, and Maintenance Departments

Group (# of personnel as of May '08)	Functions
Central Engineering (420)	Departments: Civil/mechanical engineering, control systems engineering, design engineering, project engineering, electric

	engineering, equipment & field engineering, environmental engineering & program support. Has responsibility for all engineering functions involving the substations and transmission facilities.
Construction (1,231)	Departments: Construction Management, construction services, public improvement, substation & transmission construction, admin services, environmental health, safety & training. Has responsibility for the construction management of contractors engaged in substation and transmission facility construction. Also engages directly in some maintenance and construction activities.
Substation Operations (1,108)	Departments: Planning, protective systems testing, substation operations, environmental health & safety. Has responsibility for the planning, budget, operations, maintenance and project management of substation facilities.
System & Transmission Ops (386)	Departments: Transmission planning, system operations and transmission operation. The Transmission Operations department has responsibility for the maintenance, repair and construction of transmission facilities.

New substation construction comprises a major CECONY cost activity. A new area substation presently costs from \$100 million to upwards of \$250 million. A new transmission substation with a new transmission feeder and a new underwater tunnel crossing the river can cost as much as \$500 million. The 2008 capital budget includes fourteen new substations having a total project authorization of \$3.79 billion. The 2008 capital funding for these substations is \$394 million, or 63 percent of the total Substations and Sub-transmission 2008 capital budget. The proper management of these substation projects therefore emerges as a major priority and a source of great activity.

2. Findings

a. Overview of Project Management Process in Central Operations

i. Project Initiating

Each year the Chief Engineer of Distribution Engineering issues an annual load study titled the "Area Substation and Subtransmission Feeder Ten Year Load Relief Program." This study provides a forward-looking ten-year load and capacity analysis of all area substations and the associated supply feeders. CECONY uses it to ensure that no major equipment will exceed its capability under Company planning criteria. Other CECONY departments provide various program inputs such as weather adjusted peak loads, forecasted new business impacts, and demand-side management impacts.

The Poly Voltage Load Flow (PVL) program serves as the main modeling tool for Distribution Engineering in modeling the networks. CECONY designs the networks in Manhattan, Brooklyn, Queens and the Bronx to meet second contingencies. Planning for the remainder of the system

uses a single contingency. Chapter VIII, *System Planning – Electric*, describes such planning detail. Distribution Engineering also runs a Network Risk Model that develops a relative risk ranking of the networks. Through an iterative process, the PVL program models each substation or load transfer alternative and its impact on network risk is determined before an alternative is selected. Each proposed solution to resolve a projected overload is evaluated based on estimates of project cost, time required to construct, and resulting impact on area and system reliability. The Company seeks to identify the most cost effective solutions to meet substation capacity needs identified by this long-term planning.

Each new area substation in the annual load study becomes a potential project. After issuance of the annual load studies to Central Operations, the Advance Planning and Load Relief section conducts the preliminary scope of work planning, including assessing the real estate needs. They prepare the Advance Planning Document (APD) which contains the problem statement, justification and required scope of work. This document also contains team assignments for key positions.

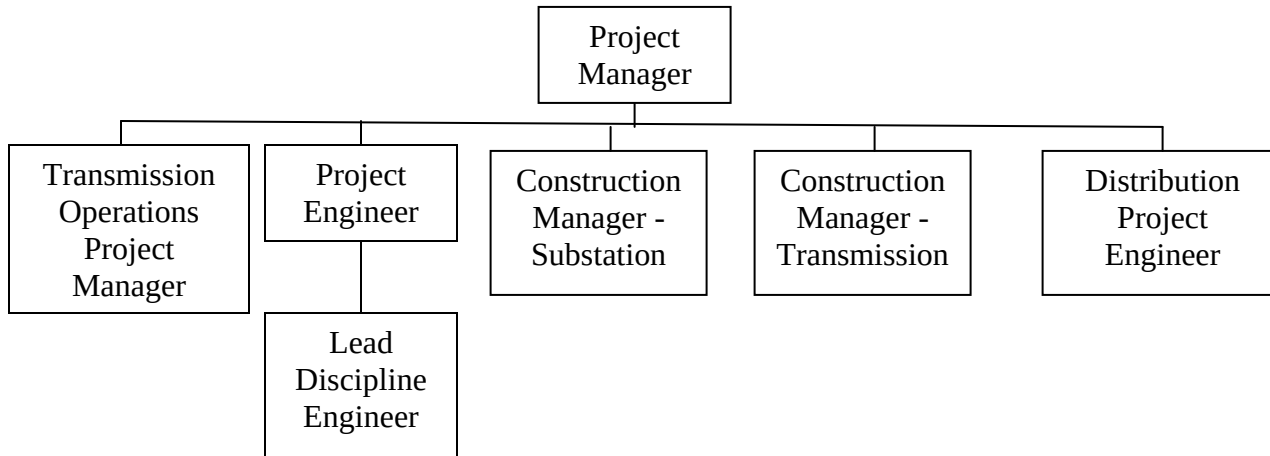
Substation Operations will assign a Project Manager and Central Engineering will assign a Project Engineer. The Project Engineer serves as the overall Central Engineering leader responsible for coordinating the work of the various design engineers that a typical project requires. A Lead Discipline Engineer appointed to the project has responsibility for technical design. The Lead Discipline Engineer will request an Order of Magnitude Estimate (OME) from the Central Engineering Estimating section. The new substation then enters the budget for approval. Once the budget is approved the project is an authorized project with an authorized maximum expenditure amount based on the approved amount..

ii. Project Planning

a. Organization

A high level organization chart for a typical new substation project follows. Its key members include:

Typical New Substation Project Organization Chart



Project Manager

- Appointed by the project user, which is Substation Operations for new substations. There are six Project Managers in Substation Operations.
- Responsible for ensuring project start, construction and completion are within schedule and cost projections.
- Manages the project and assembles the Project Team.
- Manages the project funding.
- Communicates project status and progress to upper management.

Project Engineer

- Required for projects within Central Engineering. There are five Project Engineers in Central Engineering working on substation and transmission projects.
- Serves as the leader of the design efforts for the project and assembles the engineering team.
- Coordinates the various engineering disciplines on the project. There could be as many as 70 to 80 engineers and designers representing 12 disciplines working on a substation project.

Lead Discipline Engineer

- Responsible for the technical design aspects of the project.
- Prepares project scoping documents, technical specifications and material specifications.
- Responsible for ensuring detailed estimates are accurate.

Construction Manager – Substation

- Responsible for the substation construction and equipment installation for the project. There are six Substation Construction Managers.
- Designates construction inspectors.
- Reviews construction drawings and packages.

- Manages substation contractors and vendors.

Construction Manager – Transmission

- Responsible for the transmission construction and equipment installation for the project. There are two Transmission Construction Managers.
- Manages transmission contractors and vendors.

Transmission Project Manager

- Issues transmission material requisitions and coordinates with the material vendors. There are three Transmission Project Managers.
- Coordinates the work permits, cable pulling and splicing for Transmission Operations.

Distribution Project Engineer

- Responsible for coordinating the distribution work necessary for the new feeders and load transfers.
- Manages all aspects of the distribution work including design, budgeting, construction, and load transfers.

b. Budget Planning

CECONY requires an OME to determine the total amount of budget authorization for each new substation project. The Estimating section prepares OMEs. Doing so requires a general project description, the one-line diagram, the project location, known equipment requirements, and the conceptual design. The goal set for OMEs is that they be within 30 percent of final project costs. Exact substation location generally remains unknown at OME issuance; therefore, estimators generally use historical data from other substations. OMEs contain 30 percent contingencies. The associated transmission connections form part of the project authorization and funding for new substation projects, of the substation, but the associated distribution work does not.

Estimators prepare appropriation estimates as more project details become known, in order to appropriate the authorized funds for the project. Preparation of all project scoping documents and a preliminary design package must precede requests of the Estimating section for the preparation of appropriation estimates. The Lead Discipline Engineer will request the Estimating section to prepare the appropriation estimate. The Estimating Section Estimator is considered to be a member of the project team.

CECONY considers the appropriation estimates to be “detailed estimates,” expected to be within 10 percent of actual project costs at completion. They contain a 20 percent contingency. An appropriation estimate can address full or partial project requirements. Long lead-time equipment purchases, such as transformers, often form the subjects of partial appropriations estimates. Capital Budget Request Forms provide the vehicle for submitting appropriation estimates. Their support includes a package containing the estimate, problem description, problem solution, and property records rulings. If an estimate requires revision due to a change in project scope, the Lead Discipline Engineer submits a Project Change Request to the Estimating section.

The Lead Discipline Engineer has responsibility for presenting the appropriation estimate at a Project Appropriation Review project team meeting. The Project Manager, Project Engineer, and Construction Manager must sign and approve the estimate. The approved appropriation estimate forms the basis for preparing the Capital Budget Request. The Capital Budget Request will be forwarded to the appropriate senior management levels for their approvals. The Capital Budget Request funds the project for the current budget year. A “white paper” describing the project and including the forecasted expenditures for all years accompanies each Capital Budget Request.

c. Technical Planning

Technical planning begins when the new substation project appears on the ten-year study. The Advance Planning and Load Relief section will conduct the preliminary scope of work planning, including assessing the real estate needs. They prepare the Advance Planning Document (APD), which contains the problem statement, justification, and required scope of work. The APD provides a technical overview of the project, just as the “white paper” provides a management overview. The real estate needs will determine the long range planning and schedule needed for the substation.

The Project Engineer assembles a multi-discipline engineering team. The Project Manager assembles other members of the team depending on the current team needs. Technical planning initially focuses on meeting the required real estate needs. The engineering team begins drafting one-line diagrams, conceptual layouts, equipment layouts and preparing scope documents. Some substation design work is possible without knowing the substation site location, but the detailed design cannot proceed without a known location.

Early on, upon request of the Project Manager or Project Engineer, a scheduler will be assigned to the team for schedule development. The Project Development and Standards unit in Central Engineering prepares the schedules. The staff includes nine schedulers. The scheduler is considered to be a member of the project team. *Microsoft Project*™ serves as the scheduling tool and basic schedule templates exist. Typical schedule areas include funding, site procurement, site abatement, engineering design, contract procurement, construction, outages, and project close-out. The schedule becomes “locked” after its approval and sign-off by the Project Manager and Project Engineer. All missed dates therefore require reported variances. A locked schedule cannot be changed without the approval of the Central Engineering VP. That generally happens only in cases of a service-date change.

The Lead Discipline Engineer prepares the scoping documents. The scoping documents, an important part of the design package, contain technical requirements. As with any large project, preparing the technical requirements requires progressive elaboration. Typical scoping documents for a new substation include the electrical scope, civil scope, fire protection scope, HVAC design scope, relay protection scope, and transmission scope. The Project Scope Review comprises a formal examination conducted prior to approval of the scoping documents. An Environmental Health & Safety Scope Review also occurs at this time.

The Lead Discipline Engineer will generate an equipment request for major materials that require a long lead time; *e.g.*, transformers and transmission cables. Such requests go to the

Design Engineering group for preparation and issuance of an Equipment Material sheet. This document then goes to the Equipment Group, which prepares bidding specifications, and works with Purchasing and the vendors to obtain the equipment.

The scope documents prepared by the Lead Discipline Engineer are forwarded to Design Engineering. Design Engineering will either prepare the several required design packages in-house, or contract with design vendors for their preparation. Typical packages include a demolition or site abatement package, a below grade conduit package, an above grade package for a General Contractor, and the CECONY wiring packages. The General Contractor package usually includes the building, electrical, mechanical, HVAC, and fire protection details.

The Mid-Point Design Review operates as an important design milestone. This formal review involves all interested parties. The Construction Package Design Review and the Environmental Design Review comprise other important review milestones.

Permitting and real estate activities often take a comparatively long time. The Project Manager and the Project Engineer share responsibility for them. The Project Manager becomes involved in any community work and land acquisition. The Project Engineer has responsibility for coordinating the environmental reviews, for site testing, and investigations, and for the Environmental Health and Safety checklist. The six-person Project Development & Standards group provides building permit support.

iii. Executing

The CECONY Purchasing department administers competitive bidding for substation construction proposals. Purchasing conducts a formal sealed bid process. The Construction Manager (CM) initiates this requisition process. The CM completes a Purchase Requisition, and issues a list of suggested bidders. Purchasing can negotiate for more or fewer bidders, which number from 5 to 15. Purchasing and Corporate EH&S have sole authority to pre-approve the bidders. Bidding takes place through an electronic bid process.

The CECONY Bid Check Unit acts as a completely independent bidder. For all bids over \$300 thousand, the Bid Check Estimating Group provides an independent bid to serve as a check against the competitive bids. A bid must be within 10 percent of the bid check estimate to be accepted. If the bids are not within 10 percent, Purchasing will request a Fact Finding meeting. Bid Check and Purchasing would then negotiate with the low contractor to compare data. The CM could meet with the contractor and discuss scope, conditions, or schedules, but may not discuss numbers. If the difference remains over 10 percent, the job can be re-bid, negotiated with the next lowest bidder or accepted. A re-bid could possibly have a revised scope or a change to remove risks. If the bid is to be accepted, the CM must write an *Estimate Notwithstanding* letter for approval by the user organization's vice president. The Request for Approval is then circulated and upon approval a Purchase Order is then released.

CECONY may conduct technical bid evaluations to determine if a bidder's proposal fulfills the requirements of a specification. Technical and pricing evaluations take place independently. Upon award of the Purchase Order, the successful bidder must submit an Environmental Health

& Safety Plan (EHASP) and a work plan for approval by the Construction Manager. The work plan will include a detailed schedule with milestone dates. A typical work plan may have 15 to 20 milestone dates.

Constructing the transmission portion of substation projects requires major activity. It may involve tunnels, new manhole structures, bridge attachments, new conduit runs, critical outages, new cables, and cable splicing. The Transmission Construction Manager and the Transmission Project Manager manage the overall effort. A tunnel contract will be let as a separate design package to be managed by its own Construction Manager. The Construction Operations section of the Construction group generally installs street work for new manholes and conduits, using unit-price contractors. In some cases, a contractor selected through the bid-package process performs street work. Transmission Operations will generally install, splice, and test the cables; however, contractors selected through the bid package process sometimes do so depending on workloads and resources..

For the most part the regions manage the distribution portion of the work as a separate activity. The regions have separate funding and budgeting processes, and manage their own construction timeline. Their main construction coordination activity with the substation is involved with the feeder exits at the substation site. The regions also use the Construction Operations contractors for associated street work, such as new manholes and conduits. Region personnel pull the new cables, and install the splices.

iv. Monitoring and Controlling

The Construction Manager provides for monitoring and inspection of all contractor performance and work. The General Contractor's work plan will include tasks with milestone dates. These milestones may be connected with a contractual payment. The Project Manager incorporates their milestones into the overall project master schedule. They are also required to furnish an on-site scheduler for major projects. The CECONY scheduler works with the General Contractor scheduler to log progress.

A Project Change Request (PCR) form is required for any engineering changes to a project or design document that has been approved for construction or purchase. A project change estimate is also required. A Finding of Fact must be submitted for changes affecting contractors. If the change is approved and affects the General Contractor, the Purchase Order Change Requests (POCRs) are issued and processed by the users in accordance with the Contract Administration Manual (CAM). POCRs affecting the cost more than \$15k are also subject to the bid check estimating process. If the POCR is approved, the Construction Manager initiates a Purchase Order Change Authorization (POCA). For non-engineering changes (e.g. change of work schedules, work staging area, etc) a PCR is not required and the Construction Manager will initiate a POCR to the contractor for the change.

The Construction Cost Analysis unit in the Construction group maintains a Current Working Estimate (CWE), and updates this estimate monthly. The estimate uses detailed category information from the appropriation estimate. The CWE tracks the budgeted amounts, expended amounts, committed and to-be-committed amounts, and the actual totals. An end of project

amount is also forecasted. Upon encountering changes that would increase the cost of the project beyond approved appropriation or authorization levels, the project manager must obtain the required management level review and approval prior to committing the expenditures.

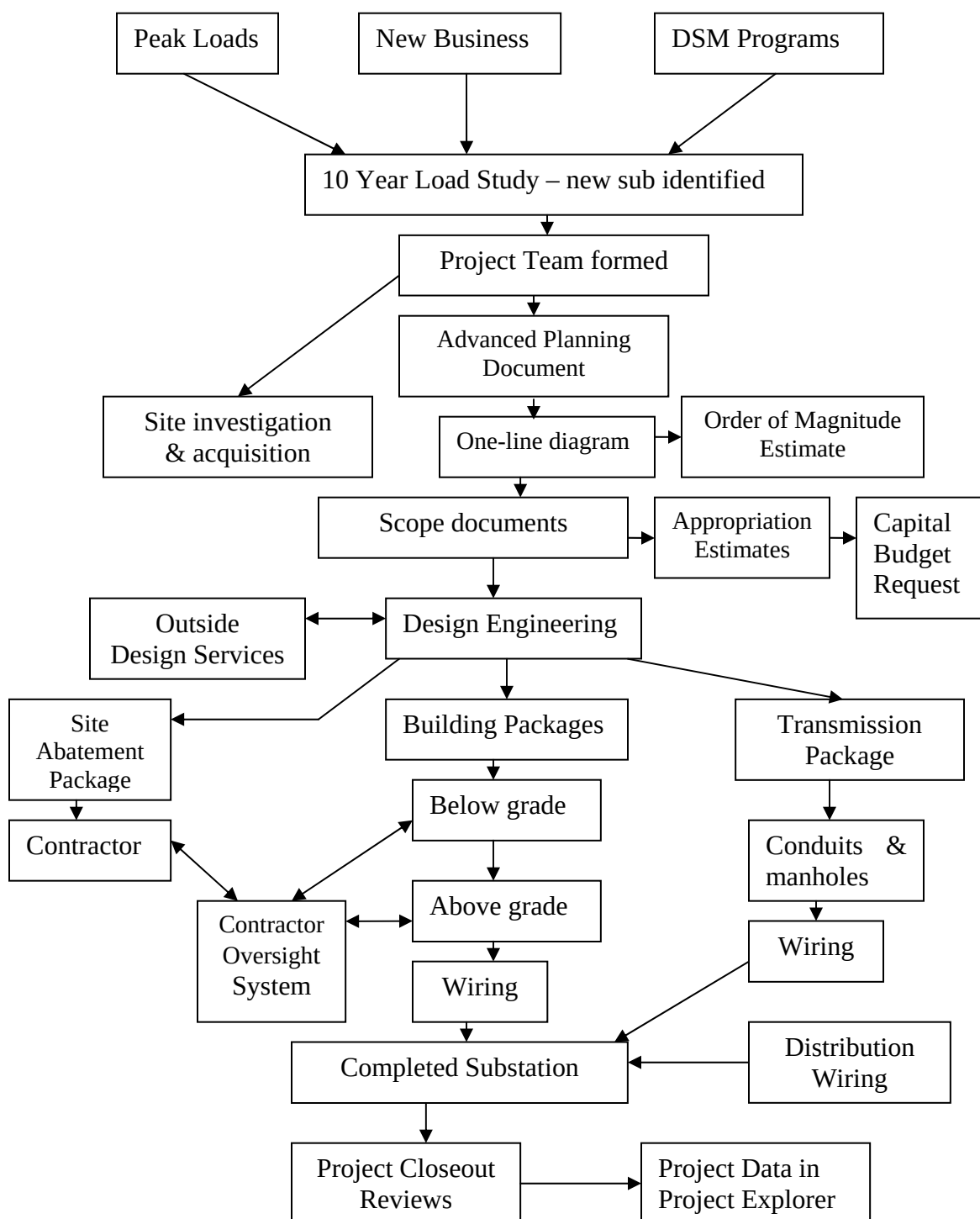
v. Project Close-out

Projects undergo a Close-Out Review. These reviews may be performed on the entire project or a portion, as construction is completed. The Construction Manager has responsibility for conducting the Close-Out Review, and consolidating punch list items. The Project Manager has responsibility for resolving items open punch-list items, such as as-built drawings, acceptance tests, and service instructions.

Six to twelve months after the project has been accepted, a formal Review of In-Service Project takes place. The Project Manager must conduct this review on all capital projects of \$2 million or more. The lessons learned in these reviews are shared with the other Project Managers, Project Engineers, and others involved in similar projects.

Project close-out activities include an evaluation of contractor performance. CECONY's Contractor Oversight System (COS) tracks and reports contractor EH&S and work performance. A Contractor Evaluation Report (CER) covering each contractor must be completed semiannually and at the end of each specific contract. The COS management system also accumulates items such as Contractor Field Observation Reports (CFOR) and Infraction Reports. COS calculates a performance evaluation factor for the contractor that has 4 CERs in a 36 month period. Performance in a variety of areas (*e.g.*, EH&S, quality, timeliness) determine this factor. The factor operates as a multiplier (from 0.95 to 1.05) for future bids by the contractor.

b. Project Management Process Flowchart



c. Case Studies

i. Case Selections

Liberty selected two new substation projects as case studies. The purpose of examining these two substations was to examine how the policies, plans and procedures actually translate into results. Each case study considered how the various elements of the project management program contributed, or failed to contribute, to project success. Liberty looked for corrective action opportunities that were taken or missed, and how the project management program facilitated, or should have facilitated, those opportunities.

The first selection was Parkview substation, a new area substation placed into service in May 2008. Liberty selected this substation because it typified those being built, and was recently completed. Completion allowed Liberty to observe all phases of the project management process. The Newtown substation comprised the second selection, which is very similar to Parkview. Newtown has a scheduled in-service date of April 2010. At the time Liberty's selection, Newtown was at the end of the design phase.

ii. Parkview substation

a. Scope of Project

The West 110th Street No. 1 area substation supplies the electrical needs of the Upper Manhattan area, [REDACTED]. Based on the ten-year load forecasts, the West 110th Street No. 1 area substation was projected to experience overloads beginning in the summer of 2008. The new Parkview substation at [REDACTED] was planned to relieve this projected overload and provide sufficient capacity for long-term area growth. The supply to this new area substation was provided by the new Mott Haven Switching station. The Parkview station was to be constructed with five transformer vaults and four installed transformers (65 MVA each). The project scope included: (1) acquisition of property, (2) demolition of existing building and abatement, (3) design of new station, (4) purchase of major and minor equipment, and (5) construction and commissioning.

The general description of the substation is:

- Two story building with a basement floor and below grade oil/water separator
- Square Footage: 115' x 199'-10"
- Five transformer bank station with switchgear and capacitor bank rooms
- Several rooms for Control Room, Storage, Fire Pump/Water Meter, PST, Communication, miscellaneous electrical equipment, bathrooms, lockers, etc.

The transmission portion of the project consisted of 138 kV solid dielectric cable systems in ducts of approximately 2.25 miles from Mott Haven Substation in the Bronx to the Parkview Substation in Manhattan. Four feeders in two duct banks were designed and installed at this time.

The distribution portion of the project consisted of 120 MW of load transferred from the West 110th Street No. 1 substation to the new Parkview substation. This was accomplished by

establishing a new network named the Triboro network. Twenty four new 13 kV feeders were established to supply the new Triboro network. The new network has 35,000 customers. The new distribution additions consisted of 415 primary sections, 50,000 ft. of conduit, 400 sections of secondary and ten 1000 kVA network transformers.

b. Timeline

CECONY used *Microsoft Project Scheduling*™ for detailed schedule of Parkview. The baseline start on the schedule was January 1, 2005. The original site location plan was to place the lot at E. 110 Street where Manhattan Operations had a building. After study this location proved infeasible. The project team looked at a number of sites, recognizing the need for M zoning. The site eventually found at [REDACTED] had a storage building on site. This site was not ideal, having only a bare minimum size lot. A residential area on one side also presented noise control concerns.

The property closing occurred on May 11, 2006. This left a total of 25 months of design and construction time, although some preliminary design work had to begin before the property was acquired. Site demolition and abatement was completed in November, 2006. As previously mentioned, the construction was completed and the substation placed into service in May, 2008.

Parkview's schedule was controlled in part by the requirement that Mott Haven substation, the source of the feed, be completed (in 2007) before energizing Parkview. Temporary load transfers were performed on the existing West 110th Street substation in 2005 and 2006 in order to delay the Parkview in-service date to 2008.

c. Funding and Costs

Originally known as the East Harlem substation in the ten year plan, an initial Order of Magnitude estimate was done and the initial project authorization was set at \$85 million.⁷ For the substation and transmission portion, two partial appropriation estimates were prepared during budget years 2005 and 2006. These appropriation requests and the amounts for each are summarized below.

• November 2005	\$57,790,000	Total project authorized was \$200 million
• August 2006	\$128,021,000	Total project authorized was \$200 million.

A final substation and transmission appropriation estimate including \$54 million of additional funding was prepared and approved by the Project Engineer on October 31, 2007. The capital budget request was approved in January 2008 at a total project budget request of \$240 million. The total project costs authorization was increased to \$250 million. The annual budget expenditures occurred from 2005 through 2008. The 2005, 2006 and 2008 actual budget expenditures were less than budgeted. The 2007 actual costs were less than 2 percent over budget. The completed total costs from the CWE were \$126 million for the substation portion and \$96M for the transmission portion, for a total expenditure of \$222 million.

There was a series of budget increases for the 2008 budgeted portion of construction. The 2007 budget request forecast for 2008 was \$49.8 million. A later addendum revised this forecast to \$64.8 million. The final 2008 budget amount was \$93.7 million.

The distribution portion was funded with a partial budget request of \$12 million submitted and approved on March 14, 2007. At that time the total cost was estimated to be \$26 million. The final distribution budget request was submitted and approved on December 21, 2007 with a total project cost of \$37 million. The 2007 budget expenditures were \$22.1 million actual cost with a budget of \$12 million, for an over expenditure of \$10.1 million. Most of this cost overrun was attributed to a change in scope which is explained below.

d. Project Cost and Schedule Drivers

The following factors proved material to Parkview costs and schedule:

- The site location affected the transmission route. There were four route options considered. CECONY had to deal with 7 to 8 agencies to cross the river. The Company ended up paying Harlem River Yards for an easement after long negotiations. This process took up substantial schedule time.
- The substation site was small. The Company had many challenges with the tight site. They had to plan the crane movements well. They used the cranes in the streets for setting the transformers. Otherwise the crane was restricted to the site as they could not utilize the street locations fulltime. They had to build the building around the crane.
- The design and construction time was very tight. The delay in finding a suitable substation site added considerably to the tight schedule. This resulted in a number of fast-tracking issues, including preparing foundation contracts before soil test drillings had been completed and addendums needed to correct and add design package information. The fast-tracking process was successful in keeping the project on schedule.
- The drawings were done in-house for both substation and transmission. There were no design delays. However the quality and content of the design packages were affected by the short design schedules.
- One of the largest construction changes after the contracts were awarded was the addition of an elevator. CECONY believed it did not need an elevator, because there were no offices or personnel on site. Parkview is not a manned substation. The New York City permitting process required an elevator to comply with the Americans with Disabilities Act. The construction package was issued without the elevator. CECONY did not originally believe it would need the elevator; its deletion was an effort to save money. After the construction package release, there was a lot of internal debate on whether the elevator was necessary. CECONY would have had to get an exception to build it without the elevator. CECONY felt it was not appropriate to ask for an exemption.
- They had to remove more rock on the site than was originally anticipated in the construction contract. CECONY could not do proper site tests before design package preparation due to the existing building there. Once the building was removed and the site was tested, the actual rock profile could be determined.
- A contract modification agreement was necessary between the general contractor and CECONY to resolve the concerns and get the project back on schedule. This was a settlement of issues associated with previous change addendums. The watertight date was

the ultimate driver. They did not start precast work until late August (it was scheduled for late June). The result of this addendum was to get manpower added and overtime to get the project back on schedule. This addendum (POCR #69E) added a cost of \$1.22 million.

- CECONY laid out the building design. The wall precaster did the wall detail design. The precaster was contracted by the General Contractor. CECONY wants to change this process and contract directly with the wall precaster in future projects. This change will result in time and quality improvements.
- The original distribution load transfer was estimated to be 60 MW. From the 30-year plans Manhattan Engineering saw that a second load transfer would eventually be needed. Therefore they elected to revise the scope and transfer 120 MW, with only one large load transfer rather than two. The distribution design time was shortened due to the lack of a known substation site. The design and construction process occurred from December 2005 to May 2008.

e. Lessons Learned

A draft of the Parkview substation project *Lessons Learned* was prepared in June 2008. This thorough review resulted in eighteen pages of items, both large and small. The major items of note are:

- Substation sites need to be acquired well in advance of design and construction.
- Increased design and construction time is necessary, for many reasons.
- Contract directly with the wall precaster to improve scheduling and control.
- Implement a building design freeze date in scheduling to limit the design rework.

iii. Newtown Substation

a. Scope of Project

At present, the entire Long Island City region is supplied from the North Queens Area Substation, [REDACTED]. The station is fully developed as a five-bank facility having a maximum capability of 483 MW. Traditional load relief projections showed that this capability would be exceeded in 2014, but higher load growth would accelerate this timing to 2012 or sooner. Moreover, the geographical configuration of the network is adverse; the source is at the extreme north, and the load is expanding at the extreme southern boundary. Therefore, the 27kV supply feeders are exceedingly long (between 62,000 and 95,000 feet), which increases the distribution costs and reduces system reliability system. Planning has determined that future load relief should be achieved by splitting the southern portion of the Long Island City (LIC) network away from North Queens, and establishing a new area substation in this region to provide load relief.

The new substation [REDACTED]

[REDACTED] The general description of the substation is:

- One story pre-cast concrete building designed for a future second story to house additional switchgear and relocated capacitor banks.
- Square Footage: 200' x 200'

- Three (future five) transformer bank station with switchgear and capacitor bank rooms
- Several rooms for Control Room, Storage, Fire Pump/Water Meter, PST, Communication, miscellaneous electrical equipment, bathrooms, lockers, etc.

The transmission portion of the project consisted of two different types of transmission cables. Initially, two 138 kV solid dielectric cable type feeders and one HPGF (High Pressure Gas filled) feeder will supply the Newtown substation transformers. The Vernon 138 kV Switching Station will supply these feeders via taps of the existing Vernon to Glendale 138 kV feeders. The Newtown substation will also have provisions for two more future 138 kV feeders to supply two future transformer vaults. The lengths of the new transmission feeders are relatively short, but it was also necessary to re-conductor the two existing HPFF (High Pressure Fluid Filled) feeders from 750 kcmil to 2,500 kcmil conductors.

The distribution portion of the project underwent a major scope change during the planning stages. The 2007 plan called for transferring a load of 183 MW from the North Queens substation, which supplies the Long Island City Network, to establish the new Sunnyside network supplied by the Newtown area station in 2011. The revised plan calls for splitting the existing Long Island City network into three networks. This will occur through the creation of two new networks, Sunnyside and Borden, in addition to a smaller, more reliable Long Island City network. These two new networks would de-load the existing Long Island City Network by 207 MW. The new plan requires a three-bank area station and some rearrangement of the existing feeders to address feeder banding and diversity.

A white paper issued by Distribution Engineering titled “On Reliability Networks” in March of 2007 provided the basis for the distribution scope changes. The new guidelines in this paper require the optimum size of a network to be 140 MW or less and set a corporate goal for network jeopardy of be less than 0.001. To accomplish each of these design criteria, the plan for the Long Island City network split changed to establish two new networks with loads less than 140 MW. The Borden network will serve 127 MW through 16 feeders. The Sunnyside network will serve 80 MW through 12 feeders. The network reliability index for the two new networks is expected to be well under the corporate goal of 0.001.

b. Timeline

*Microsoft Project Scheduling*TM was used for detailed scheduling. The baseline start on the schedule was June 28, 2005. The substation in-service date is April 1, 2010. This site was already in hand when the schedule was established. Design and construction work is presently progressing on schedule.

c. Funding and Costs

The majority of the feeders in the existing Long Island City network have reached or are nearing their capacity. There remains only limited flexibility to resolve overloads in this network. Transferring load from one feeder to another is not likely, because of high loads on neighboring feeders as well. Constructing additional conduit and installing additional feeders provides the only means of resolving overloads. By the year 2011, main run overloads on 1C750 EPR cable

will increase throughout the entire network. The cost of relieving feeders by the year 2011 will increase greatly, to approximately \$10 million per year. The North Queens substation capacity can withstand the increasing load of the network until 2013. A cost analysis study identified a cost saving of \$11 million if the substation is established by the year 2011.

The Newtown substation was originally authorized in the 2007 budget at \$150 million. The 2008 budget increased the project authorization for the substation and transmission portion from \$150 million to \$200 million. The 2008 budget requested funding for \$59 million of this total.

Four partial appropriation estimates were prepared for the Newtown Substation project during budget year 2007. A summary of the appropriation requests and the amounts for each are summarized below.

April 2007	\$40,000,000
July 2007	\$20,000,000
October 2007	\$43,990,000
November 2007	\$1,993,000

The final appropriation estimate (prepared and approved in March 2008) included a total project request of \$197,323,000. The CWE as of September 17, 2008 shows an anticipated cost of \$133 million for the substation portion and \$64 million for the transmission portion. The distribution portion had an original scope of one new network at planned funding of \$3.9 million in 2008 (and \$12.5 million total). Revising scope to include two new networks brought the planned funding to include \$10 million in 2008 (\$28 million total).

d. Project Cost and Schedule Drivers

The following factors proved material to Newtown costs and schedule:

- There were site cleanup issues from a former gas station and an off-site issue with ground water flowing across the site. Monitoring wells were already on site. The previous spill case had been closed out with the NY Department of Environmental Conservation. CECONY can get back as much as 15 percent of construction costs for sites approved such as Brownfield. Qualification, however, requires a two-year process of monitoring wells analysis and soil borings. CECONY understood that State regulation changes might eliminate utilities and land that was already purchased from eligibility. This posed the risk of failing to qualify even after undertaking a two-year process. CECONY therefore decided not to seek qualification. CECONY did discover that the site required some remediation; installation of below-grade filtration for the contaminated ground water formed the solution.
- CECONY advanced the original, 2011 in-service date to 2010. They had been working towards this timeframe for awhile, but had to get concurrence from each engineering discipline to make the change. The in-service date advancement resulted from a number of incremental changes. The 2006 Long Island City network incident comprised one schedule-improvement driver.
- A lesson learned from other substations led to a decision to precast the walls and to contract directly with the outside precaster for their design, engineering and fabrication.

- Another change made to reflect lessons learned included requiring a full-time safety person for the general contractor. CECONY has other, smaller changes in the construction; *e.g.*, addressing rebar locations too close to electrical penetrations, incorporating smaller (3") wall penetrations in the fabrication, improving missed alignments on anchor bolts and embeds, trying to improve site crane impacts by applying for street closing permits (which will avoid having to work around the crane on site).
- Adding a staff augmentation scheduler reporting to the Substation Construction Manager improved site scheduling resources. The scheduler works on the baseline schedule with the contractor, handles the electronic end of the scheduling software, and provides reports.
- Work on the new portions of the transmission line tap includes a trial design/build process. The historical approach designed the job end to end using surveys, test pits, profiles, and other tools requiring street digging. The contractor would then dig up the streets again to install conduits and manholes. The Newtown contractor, in contrast, starts with the beginning and end points and some overall design constraints, then digs test pits, and then installs manholes and conduits while the streets remain blocked and open. This work takes place under a lump-sum bid.

iv. Processes Verified

Liberty verified adherence to many of the project management process items in the written procedures during these case studies, including:

- Lessons Learned process
- Scope preparation and control process
- Schedule preparation and control process
- CWE preparation and monitoring
- Bid check reviews
- Formal status reports
- Minutes of meetings
- POCR process and control
- Contractor Evaluation Report process
- Environmental Health & Safety plans.

v. Comparison of Parkview to Newtown

The table shown below compares selected key items of Parkview and Newtown substations.

Item	Parkview	Newtown
Perimeter-to-perimeter site const.	Yes	Yes
Site dimensions	200 ft x 115 ft	200 ft x 200 ft
Number of stories	Two	One with future second
Number of transformer bays	Five	Five
Site acquisition to IS date	25 months	58 months
Direct wall precaster Contract?	No	Yes
Final appropriation est. to IS date	Four months	25 months
Capture of lessons learned	All at project close-out	One set; end of below grade package

Newtown design and construction time has more than doubled. This change provided benefits by reducing the need for fast tracking and allowing for a more considered and a smoother design and construction cycle. After CECONY built substations in 2004 (after a nearly 10-year hiatus described below), many lessons learned showed the need for more design and construction time. Newtown substation also benefited from the ability to prepare an appropriation estimate much earlier by using the actual cost data from recently built Parkview, Rockview and Astor substations. Appropriation estimates have a goal of 10 percent accuracy. CECONY has improved its estimating processes by becoming able to determine overall project costs earlier than happened with Parkview. Contracting directly with the wall precaster offers another source of improvement. It allows for more project control over quality, schedule, and costs.

d. Project Management Process Structure

i. Project Management Program

Central Operations uses a number of written Project Management procedures:

- CE-0301 Engineering and Construction Projects
- CE-0302 Engineering Evaluations, Reviews and Inspections
- CE-0304 Cost Estimating
- COP 10-0-5 Project Management
- CE 0401 Engineering Drawings, Material Lists and Calculations
- CE 610-3 Project Closeout Procedure.

Liberty found these detailed and thorough procedures very sound in defining the project management program. They listed key individual roles and responsibilities, expectations, accountabilities and defined the overall project management process. They evidenced regular updating, and references to them by many of the interviewees demonstrated effective communication of their content and purpose.

Other procedures complement them in supporting the project management program:

- CI-000-1 Delegation of Authorities
- CI-280-4 Contract Management
- OP-280-1 Contract Administration Manual
- CI-610-1 Capital Budget Process.

CECONY did not construct any new substations between 1993 and 2002. Starting in 2004 new substation construction resumed. CECONY constructed three substations in 2004 (Trade Center, Murray Hill, and Grasslands), followed by Mott Haven in 2007, and then Parkview and Rockview in 2008. By 2017 CECONY plans to add seven new substations.

The requirement of formal lessons learned documentation at project close-out comprises an important aspect of the CECONY project management process. The lessons learned from the 2004 series of projects revealed a number of project management areas of improvement; *e.g.*,

payment of labor premiums, rework, double handling, contract addendums, specification voids, permit and community issues, and vendor design.

A team of managers assembled from the three 2004 substation projects reviewed lessons learned. These Project Managers and designers generated a top ten list of “ways to build a better substation”:

1. Anticipate system requirements earlier
2. Tie completion date to land procurement
3. Advanced evaluation time of Community & Political Issues
4. Balance innovation with standardization
5. Allow adequate time and reach engineering consensus among the disciplines
6. Freeze the Design
7. Single package of civil, architectural, building electrical scopes for procurement
8. Integrate utility specific conditions (Weather, Outages, Holiday Embargo, etc).
9. Acknowledge additional safety risks and appropriate proper funding
10. Team Incentives for achieving Goals- Safety, Target dates and Costs.

CECONY has also conducted annual reviews of the individual project lessons learned to incorporate into process and activity changes and improvements. QA audits and internal surveillance reports comprise other reviews that have shed light on ways to improve project management techniques, tools, and execution. The annual 2007 review of lessons learned on fourteen major projects included the following:

- Poor package quality from Architect/Engineering (A/E) firms reported on 7 of 14 projects.
- Change in scope/insufficient initial scope reported on 5 out of 14.
- Changes in assignments of essential team members reported on 4 out of 14.
- A/E firm failure to adhere to schedule/late packages reported on 4 out of 14.

This healthy feedback process has documented any major project management shortcomings found in recent years. Developing a smoother project management process and avoiding the need to fast-track projects to meet schedules have been primary sources of improvement efforts. Results include efforts to allow more design and construction time, to improve the estimating accuracy, and to enhance the quality of design packages.

The most important lesson learned from past substation construction experience has been a straightforward one: the need for additional design and construction time. The Parkview substation design experience identified the need for improvement in this key determinant of project cost and schedule. A primary lesson learned from this event was that added schedule time gives more and useful opportunity to explore alternatives. This lesson led to an initiative to develop a template schedule for the necessary time required to engineer, construct, and commission a new substation.

Central Operations has made a number of internal changes to facilitate better project management in recent years:

- 2002: Project Managers were set up in Substation and Transmission Operations. Scheduling section was also established that year.

- 2003: Project Engineers were established in Central Engineering.
- 2005: Creation and consolidation of the Substation Construction Managers and Transmission Construction Managers in the Construction group.
- 2005: Formation of the Advanced Planning & Load Relief section in Central Engineering to address electric planning issues including substation real estate needs.
- 2006: Creation of the Estimating section in Central Engineering to address estimating issues.
- 2007: Pursuance of a Central Operations initiative (“Excellence in All That We Do”) to address improvements in estimating, scheduling, design quality and other areas of project management.

The 2007 Central Operations initiative led to the creation of cross-functional teams to evaluate issues and pursue improvements in three areas:

- Development of more detailed schedules for the early stages of projects
- Cost estimates of appropriate accuracy at key points in the project life cycle
- Improved use of schedules to manage projects and personnel.

ii. Project Manager Team

Six Central Operations Project Managers have responsibility for electrical substation construction. Overall they are experienced and qualified for their positions. All have been in their positions for a minimum of three years, and have an average of 24 years experience with CECONY (with the minimum being 15 years). All have engineering degrees; one is a registered professional engineer.

Three Central Operations Project Managers have responsibility for electrical transmission construction. They too are experienced and qualified for their positions. Two have been in their position for seven years; one is new as of this year. They have an average of 18 years experience with CECONY, with the minimum being 17 years. All have engineering degrees.

Eight Construction Managers have responsibility for electrical substation and transmission construction. They are also experienced and qualified for their positions. They have an average of 21 years experience with CECONY, with the minimum being 10 years. Seven have engineering or technical degrees; one is an attorney with construction-related experience; two are registered professional engineers.

Five Project Engineers have responsibility for electrical substation and transmission design. They are experienced and qualified for their positions. Four have been in their present position for over 5 years; one has been there for 1½ years. Four have engineering degrees; one is a registered professional Engineer.

iii. Dedicated Project Support Resources

Central Operations has hundreds of active projects and many ongoing programs at any given time. Some programs involve replacing many separate pieces of equipment, each with its own schedule, scope, and cost features. It is difficult to quantify exactly how many active projects are

in various stages. One measure is to examine the work levels in Design Engineering, which has about two hundred projects currently active in the design package stage. Most of the personnel in Central Operations work on multiple projects at any given time.

The project management process of team formation allows for individual assignment to a specific function (*e.g.*, scheduler, estimator, Lead Engineer, Project Engineer, Project Manager and Construction Manager) on the team. Major critical engineering, design and management resources get assignments through this team-formation process. Limited resources have required significant assignment shuffling to be needed. This chapter's section on *Project Management Process Structure* noted that 2007 lessons-learned documentation reported problems from changes in essential team members on four of fourteen major projects. There exists no scheduling or capacity system to manage design resources.

The Project Engineer initiated the process for assigning the engineering resources to project teams. The Project Engineer sends an email to the section managers in Central Engineering to inform them of resource needs for new project teams. Central Engineering has numerous sections; they include Station Project Engineering, Transmission Feeders Engineering, Relay Protection Engineering, Civil Engineering (Substations and Transmission); and Mechanical Engineering. External factors, such as in-service dates, serve to set project schedules. The design portions of the schedules must be back loaded to fit those dates, which can produce design-time *crunches*. Addressing the steam plants also contributes to design time crunches, because steam plant schedules use spring and fall outage windows. Project Engineers are thus subject to the requirement to adjust their schedules as a result of resource constraints.

Contractors provide a source for many scarce personnel resources. For instance, the Newtown substation project used contractors as schedulers at the job site. Also, Design Engineering commonly uses outside A/E firms to prepare detailed design packages. Outside resources performed 50 percent of design work in 2007. Design Engineering has worked to reduce this total moderately. Outside vendors performed about 40 percent of 2008 design work as of October. This chapter's section on *Project Management Process Structure* addresses the design-package issues (*e.g.*, quality and timeliness) that use of A/E firms has raised.

iv. Management of O&M Programs

Significant O&M efforts often require cross-functional participation. In Central Operations these projects include items such as responding to a transformer, breaker or transmission cable failure. Liberty found that Central Operations uses similar project management principles (using Lead Discipline Engineers, design/scope control, schedule planning and contractor management) on these projects.

v. Project Initiation and Approvals

Overall Liberty found that formal project approval and kick-off comes with an adequate scope definition and cost estimate in place. The drafting of a preliminary scope document known as an Advanced Planning Document starts the design process on each major project. The written Central Operations project management procedures describe this process.

Estimating accuracy comprises an important facet of proper project management. Failure to have an accurate baseline cost plan, makes it difficult to monitor and control overall project costs. Central Engineering's Estimating section currently performs three types of estimates, with each having an associated accuracy:

- Ballpark (now known as marginal cost study) - +/- 40 percent
- Order of Magnitude (OOM) - +/- 30 percent
- Appropriation - +/- 10 percent.

The project authorization process relies on Order of Magnitude estimates. The appropriation estimate provides the basis for budget funding. A final appropriation estimate is prepared when all scope information is available. Once a project is appropriated and is in the construction phase, Engineering does not revise the estimate. CECONY established KPIs in 2008 to measure and report on estimate accuracy for projects costing over \$2 million.

The Estimating section was established in March 2006. Prior to this the Lead Discipline Engineers did estimating. There were accuracy problems with these estimates. Liberty believes they resulted primarily from a lack of available historical estimating data and variances among the engineers. In particular, many of the OOM estimates were too low. As appropriation estimates were prepared, this gave the appearance of the substations greatly increasing in cost. In actuality the original cost estimated in the OOM estimate were not accurate in the first place.

In March 2006 Central Engineering formed the Estimating Section. This section has dedicated staff and resources. They have since drafted and defined estimating procedures. One of the steps the Estimating Section took in 2007 for the 2008 budget was to revise the OOM estimates for new substations. The table below shows the difference between the previous OOM estimate done in 2006 by the Lead Discipline Engineers and the revised OOM estimated prepared in 2007 by the Estimating Section. All of the projects in the table have only an authorized cost. No actual appropriation funding has yet started on any of them. Also, the Queens substation is a new item. The OOM for the Queens substation appears to be more in line with the others. In addition to these revised OOM estimates in the 2008 budget, several substations with low OOM estimates had a detailed appropriation estimate submitted in 2008. The York, Westside and Newtown substations saw greatly increased project authorization costs when their appropriation estimate was submitted for the 2008 budget.

New Substation	Project Authorization(\$M)	
	2007	2008
Gateway	\$150	\$300
Hillside	\$150	\$350
Hudson Yards	\$150	\$300
Idlewild	\$150	\$270
Nevins	\$200	\$265
Queens	---	\$300

After establishment of an annual appropriation estimate project funding, the accuracy goal is +/- 10 percent. The data in the table below shows the overall accuracy of the Substations Operations

load relief budget for the past three years. As a group and also as individual projects, the annual budget accuracy is within the 10 percent goal.

**Substation Operations Historical Capital
Budget Performance on Load Relief Projects**

<i>Year</i>	<i>Actual</i>	<i>Budget</i>	<i>Variance (%)</i>	
2005	\$160.2 million	\$194.2 million	(34.0)	-18
2006	\$275.7 million	\$284 million	(8.3)	-3
2007	\$345.5 million	\$362.5 million	(17.0)	-5

Transmission Operations has a small capital budget for load relief, as compared with Substation Operations. The transmission line costs associated with substation work are included in the above substation costs. The new M29 feeder extension is an exception. The costs for this project lie in the Transmission Operations budget. The M29 project has met with permitting delays that have greatly affected its corresponding budget. Excluding M29, the bulk of the Transmission Operations capital budget is composed of various feeder replacement programs. Liberty found no estimating concerns in this area. This cost data is shown in detail in Section B.2.f of this report chapter.

e. Project Management Knowledge Areas

i. Application of Cost Management Methods

The holistic approach to cost management requires moving from an approach that takes a strictly accounting perspective to a results perspective focused on the work itself. Process controls would tend to be proactive and occurring real time in the management process. Liberty found this approach exhibited somewhat in the Central Operations project management process. Some examples of this approach are:

- Use of the strong Project Manager and project team approach in making critical real time decisions on the project operations
- Use of the Current Working Estimate (CWE) to view, forecast and manage cost details for 75 percent of the capital budget expenditures
- General consistency in meeting annual project budgets
- General use of KPIs for critical project process milestones such as design package release dates, building water tight dates and in-service dates
- Use of a Lessons Learned process to analyze performance and make changes for improvements.

One aspect of cost management not found was an analysis of the cost consequences of a past problem or a future alternative action. In addition merely to defining the problem or solution, a cost analysis would provide quantifying data. This missing piece would add perspective and provide a basis for management action.

ii. Cost Management Planning for Major Work Components

The Project Manager has responsibility for all budgeting and cost management issues associated with the project. Their responsibility starts with making sure that the estimates are correct. A

financial analyst is also assigned to the project. The Project Manager has to manage the costs of the individual construction packages and balance cost over runs with under runs.

Central Operations uses the Central Engineering Estimating System (CEES). The appropriation estimate contains all of the details. This estimate has major areas itemized under purchases, contracts, company labor (person hours and cost), material and supplies, and other (testing, for example). Overheads and contingencies are then added. Overhead items are engineering, administration, payroll and taxes and Allowance for Funds Used During Construction (AFUDC).

The Construction Cost Analysis section in the Construction Group tracks the Central Operations capital budget. They provide and maintain a Current Working Estimate (CWE) for projects over \$500,000. Of the \$850 million of construction work underway in Central Operations, about 75 percent of the dollars are tracked in a CWE. There are about 100 current CWEs, which undergo monthly updating. For each cost item the CWE sets forth the appropriated amount, expended amount, committed amount, to-be-committed amount and the actual total. The CWE provides an end-of-project forecast. The Project Manager uses this data for cost management planning.

Major contracts' cost item detail gets loaded into the CWE from the contract performance task list. Each item in the task list has an associated payment. There might be 15 to 20 tasks on the list. These items are all placed in the CWE and tracked. A separate CWE module tracks the transmission costs associated with a new substation.

Before the construction contracts are let, design changes routinely occur. After a contract is let, a Finding of Fact is required for approval. If approved, the POCRs are issued and processed by the users in accordance with the contract Administration Manual (CAM). Time and material or unit price methodologies are typically used for change orders. Section B.2 of this chapter examines this process.

iii. Exit Ramps for Large Projects

Liberty found a number of examples of stopping or delaying projects in the 10-year planning cycle. Substation in-service dates are rearranged to take advantage of changing conditions. Liberty found a willingness to use stopping or delaying projects in response to cost and other issues.

iv. Scope Control

After the initial scope is defined in the Advanced Planning Document, it is further developed by the engineering design team. Typical scoping documents for a new substation include the electrical scope, civil scope, fire protection scope, HVAC design scope, relay protection scope and transmission scope. A formal Project Scope Review process represents the final approval of the project scope.

After such approval and release of the scope, a Project Change Request form and process serves to initiate, prepare, review, approve and monitor design changes. Once a project contract has been awarded, a Finding of Fact process provides the vehicle to initiate, prepare, review, approve

and monitor contract changes. The Contract Administration Manual contains a detailed and formal process for these changes. Section B.2 of this chapter examines this process.

v. Quality/Cost/Schedule Relationships

Various inspection and monitoring systems exist to assure the quality of work performed by company and contractor forces. One important aspect of the quality/schedule trade-off is illustrated in the process of the construction packages released by Design Engineering for large projects. On one hand, a high quality of the final design package is always preferred. Conflicts among the engineering disciplines need to be worked out. Correct dimensioning and a proper level of detail need to be shown on the construction drawings. Rework costs need to be avoided. On the other hand, the schedule of the design package release must be met or construction time will be pushed. A lack of proper design and construction time in the project cycle will cause inherent conflicts in this area. Liberty observed this result in its study of the Parkview substation project (discussed in section B.2 of this chapter).

vi. Process for Contingencies

The Company's policy in the Central Engineering organization, which handles engineering estimates on substations and transmission projects, is to apply contingency to the labor, equipment, and materials/supplies cost elements of an estimate, following the Stanford Institute for Economic Policy Research Paper No 04-05 dated February 9, 2004 as follows:

1. Order of Magnitude Estimate: 30 percent contingency
2. Appropriation Estimate: 20 percent for construction contracts and 15 percent for company labor.

The Central Engineering organization develops estimates for many substations and transmission projects one to three years in advance of the actual construction start date and where the construction schedule would extend as much as three to four years.

The Project Manager has responsibility for managing the contingency funds for the project. The Project Manager can release these funds as needed. The contingency releases are tracked closely as a part of the Current Working Estimate process.

vi. Project Management of Contractors

The requirements for the management of contractors performing construction projects or service projects are covered in detail in the Contract Administration Manual. This procedure defines these requirements according to accepted project management practices. Section B.2 of this chapter covers this topic in more detail.

One area of concern is Design Engineering's management of A/E firms who prepare the design packages. The Lessons Learned process has raised concerns about A/E firm design-package output quality and timeliness. Design Engineering has about 200 projects currently active. In 2007 outside A/E firms did 50 percent of the Design Engineering design work. A/E firms are providing about 40 percent of this work for 2008 so far. As a result Design Engineering is trying to provide more of the design work with in-house resources.

The Design Engineering bid process appears to be sound. Design Engineering maintains a list of qualified companies. About five are invited to provide lump-sum bids. Design Engineering requires the individual names to be submitted so they can determine if individuals are qualified. Person-hour estimates must be submitted. The bidder also must be able to meet the schedule. The bidders submit two bid packages. One has dollar figures and the other one does not. Design Engineering conducts a technical evaluation of the bids; Purchasing conducts a cost evaluation.

The management of the design process by Design Engineering also appears to be sound. Design Supervisors manage the in-house work. Technical Coordinators manage the outside vendors. The Technical Coordinators make sure the RFP and the schedules are met. They also look at the drawings being submitted. The Mid-point Design Review sets a major milestone. Payments follow the meeting of milestones. The Mid-point Design Review is usually tied to about a 30 percent payment. 60 to 65 percent is paid when the preliminary design package is ready. Design Engineering conducts a review of the preliminary packages before they are reviewed by construction. The Mid-point Design Review allows a determination of whether a project will be late. The preliminary package is the most critical date. Design Engineering will look at the critical path schedule and get additional resources or more outside help if needed. Sometimes they release just a physical package and follow it up with more detail later.

Design Engineering is pursuing two main areas of improvement. First, the quality of the design package must be high. If not, it affects schedule, cost, and reliability (the outage window is missed). Second, they would like to increase productivity and do more jobs in-house without increasing staff.

f. Organizational Culture and Capabilities

i. Definition of Project Manager Role

Central Operations has a number of written Project Management procedures in place that define the role of the Project Manager. These procedures are:

- CE-0301 Engineering and Construction Projects
- CE-0302 Engineering Evaluations, Reviews and Inspections
- COP 10-0-5 Project Management.

Liberty found these procedures provided a sound, comprehensive definition of the Project Manager's role.

ii. Project Manager Expectations and Resources

Liberty found that the procedures (discussed in more detail in Section B.2 of this chapter) defined in detail the expectations of the Project Manager. These expectations were consistent with the authority and resources given to the Project Manager.

iii. Consistency of Project Management Requirements

The procedures described more fully in section B.2 of this chapter also defined in detail the project management requirements and procedures. These procedures appear to be applied consistently across all projects.

iv. Project Management Budget Linkage

Liberty found clear linkages between project management and the budget systems. From Central Operations procedure CE-0301, the budget responsibilities of the Project Manager are:

- Ensuring project estimates are developed
- Obtaining concurrence for project estimate
- Obtaining appropriations for the project and subsequent changes
- Ensuring project start, construction and completion are within cost projections.

v. Project Priority Management

Central Operations uses the following weighted attributes for prioritizing electrical transmission and substation projects and programs.

Attribute	Weight	Attribute	Weight
Safety/Health	15%	Operational Technical Improvement	5%
Demand Relief or Capacity Change	15%	Efficiency	5%
Reliability MTBF or % Overduty	7.50%	Carryover of Work in Progress	5%
Availability	7.50%	Structural Restoration	5%
Regulatory or Environmental	7%	Public Perception	4%
Obsolescence	7%	Outage Availability/Coordination	2.50%
Cost	6%	Strategic Issue	2.50%
Technical Improvement	5%	Report Recommendation	1%

Each attribute was further defined by a weight (plus 3 to minus 3) as to the relative impact on individual attributes, so that project scoring would be more detailed and replicate the management decision-making process. Evaluations use project write-ups, and are reviewed with project sponsors. The projects are then ranked in accordance with these project scores, and reviewed with the user organization. The final review reconciles the approximation of the numerical system with the judgment of the managing authority of each business unit.

Once these projects have been approved and scheduled, the Project Manager has control over the resources.

g. Project Management Applied to Program Management

i. Collective Management of Small Projects

A project is a discrete scope of work with beginning and end points. A program is a collection of small projects occurring annually (or over some other established window, but generally broken into annual increments) to meet the objectives of a long range scope of work. The detailed written project management procedures in Central Operations apply to projects, but not to programs. The Substation and Transmission Operations organizations have discretion to decide how to manage their programs. The Program Manager may or may not choose to apply the project management organization and resources to the management of programs. Past program management has not included many of the important project management principles such as the use of a Project Engineer. The tendency in both organizations now is to apply more of the project management principles in their program management.

The management of all programs, both capital and O&M, are described below for Substation Operations and Transmission Operations.

A Planning group of ten people in Substation Operations provides planning and scheduling support for outage requests. They coordinate work bundling to minimize the number of outages. They also provide capital programs work planning, including Microsoft™ schedules for the work. Some are physically located in the field. For some programs, they coordinate the program. For other programs, they own the program management role. Substation Operations is trying to place more focus in the area of capital programs. Previously, the planning manager in each of the field areas managed all of the programs.

Each of the planners has one or more program assignments. They are responsible for a total of \$70 million in annual capital programs. They function across the regions to manage the programs. Central Engineering will prepare the scope of work and the budget appropriation for the year. Substation Operations planners will prepare the estimate for exact equipment replacement jobs only. They schedule the work and track the job progress (percent spent and complete).

Central Engineering will look at service equipment trends to initiate program work. Also, should the field have an equipment problem, the issuance of an Engineering Service Request (ESR) calls for problem investigation by Central Engineering. Substation Operations acts as a liaison between Central Engineering and the field. They will also help prepare the white papers for rate cases. Central Engineering prepares the appropriation estimates. Programs are usually estimated by order of magnitude estimates. A small capital and facilities upgrade budget is allocated to the regions. The remaining program dollars are earmarked for specific equipment.

Substation Operations may request a Project Engineer in Central Engineering to prepare a schedule. Substation Operations would like to have Project Engineer support for more programs. A recently initiated pilot covering six programs has been initiated to test such added support. There is a desire to “tighten up” these schedules. The primary goals of the pilot are to improve

the work flow process, maintain the schedule dates, and avoid rescheduling outages arising from lateness in engineering packages.

Substation Operations planners manage the budget. They verify the cost figures using the CWE. They evaluate options. One option is to try to get additional budget funds from the capital budget reviews. Overall, the group wants to do more equipment program work, and are annually looking for more available dollars.

Transmission Feeders Engineering in Central Engineering coordinates the internal Transmission Operations programs. This group prepares the initial project authorization, white paper and board book information. After preparation of the work scope documents, estimating personnel prepare the appropriation estimate and the appropriation document for budget funding. Transmission Feeders Engineering provides the job specifications and instructions. Transmission Feeders Engineering enters the job schedule in *Microsoft Project*™. For internal programs Transmission Operations enters the work order in Maximo. The Maximo order would contain schedules and instructions for the crews. The bulk of this work is outage dependent. Transmission Operations coordinates the outage request.

In effect, the program management process operates like the project management process does for transmission line replacements. Other Transmission Operations program work is minor, consisting mostly of O&M inspection and maintenance work.

The next table shows the budget and actual cost history for the past three years of the capital programs. Substation Operations manages its programs to procure additional program work above the budgeted work to the extent that the overall capital budget allows. Transmission Operations program history shows management of the programs within the allotted budget.

SUBSTATION CAPITAL PROGRAMS				
Type	Number of Programs	05-07 Budget (\$M)	05-07 Actual (\$M)	Variance
Relay	4	\$24.7	\$24.7	0%
Substation	24	\$124.7	\$134.3	8%
Equipment	8	\$56.8	\$93.1	64%
Total Capital Budget		\$1188	\$1168	-2%
TRANSMISSION CAPITAL PROGRAMS- Feeder Replacement/Reliability				
Type	Number of Programs	05-07 Budget (\$M)	05-07 Actual (\$M)	Variance
Feeder Replacement	12	\$272	\$105.8	-61%
Fdr Repl less M29 and Queensboro Bridge feeders	10	\$87	\$71	-18%
Interference	3	\$6	\$5.6	-7%
Environmental	1	\$5	\$5	0%
Total Capital Budget		\$304.8	\$134.8	-56%

ii. Application Across All Organizations

Both the design and construction contractors used in Central Operations operate under well-defined management practices, as detailed in Section B.4 of this chapter. The construction contractor management practices are detailed in Section B.1 of this chapter. These processes align the contractors as a full participant in the project team and project management process.

3. Conclusions

1. There exists a project management program that is targeted and that addresses all elements of effective project management.

Overall Liberty has found that a basic project management program exists in Central Operations. Liberty's case studies illustrated that there have been improvements in the available design and construction time. Long-range substation site acquisition and planning have helped improve these times. The Central Operations initiatives in project management areas such as estimating, scheduling and quality of design packages will continue this improvement. These initiatives should be completed and incorporated into the written procedures.

2. There exists a team of project managers with substantial experience in all elements of project management.

Overall Liberty finds that the project managers in electrical substation and transmission construction are experienced and qualified for their positions.

3. Large projects are provided with dedicated support resources, but lessons from past project close-out reviews consistently indicate that these resources may not be adequate.
(Recommendation 1)

With hundreds of active projects underway, it is common and practical that critical project resources will need to be shared. Some of these critical project resources are in scheduling and design engineering. Also, the Project Managers and Project Engineers are in high demand. The limited resources have caused a good amount of assignment shuffling to be necessary. This issue arose as a concern in four out of fourteen major projects completed in 2007. In addition, the Company has had to use many outside A/E firms to meet construction schedules. The reliance upon these outside A/E firms to meet the schedules is significant. About 50 percent of the 2008 design packages were prepared by outside A/E firms. The quality and timeliness of the A/E firm design packages have often been cited as concerns in project close-out reviews.

4. Project management principles are being applied to significant O&M efforts.

Liberty found that the project management principles are being applied to significant O&M efforts that require cross-functional participation.

5. The formal approval and kick-off of projects is not permitted in the absence of reasonably firm scope definition and a consistent quality cost estimate.

A process of defining scope definition and scope control is in place before project kick-off.

Past estimating accuracy for major projects has not been acceptable. In particular the Order of Magnitude estimate accuracy has been poor. CECONY has made recent organizational changes to improve the estimating process. Overall Liberty feels the estimating process is now on a better track for success. The new 2008 KPIs on estimating have increased this awareness. The Central Operations initiative underway in reviewing the estimating process will continue this improvement when this initiative is completed and incorporated into the written procedures.

6. Some of the philosophies, principles and methods of holistic cost management are not being applied in the project environment. (Recommendation 2)

Liberty has observed some aspects of holistic cost management in Central Operations. The project management control process has tended to be real-time, proactive, and participative. One aspect that has not been observed is a cost analysis of the changes made in response to lessons learned. Having this cost analysis available would establish the place of cost in the hierarchy of priorities and drive the organization towards more rapid action. A total holistic approach to cost management would elevate the company's organization and effectiveness.

7. Cost management plans are in place for major components of the work.

The Project Manager in Central Operations has clear responsibility and authority to budget, manage and control costs. The major tool used for the cost management plan is the Current Working Estimate (CWE). This cost management plan is in place and in consistent use for major projects in Central Operations.

8. Large projects contain "exit ramps" to permit management reconsideration if costs begin to escalate.

Liberty found a willingness to stop or delay projects if costs or other issues arise.

9. A program of scope control identifies scope deviations early, and analyzes and mitigates their effects.

Overall Liberty feels that a good program of scope control exists. The initial scope is being clearly defined upfront in an Advance Planning Document. A formal Project Scope Review Process is in place to provide final approval of the detailed project scope documents. After that approval, a formal Project Change Request process is in place to initiate, prepare, review and approve any project changes.

10. The role of quality and its relationship to cost and schedule achievement is clearly defined and understood by all project participants.

Overall Liberty found the role of quality and its relationship to cost and schedule to be well-understood by project management participants. Numerous inspections and monitoring systems exist to assure quality of work. Liberty found that the lengthening of the design/construction cycle time to avoid potential conflicts has been recognized by Central Operations. Initiatives underway such as the substation design schedule template should greatly improve this process.

11. A process and a process owner for the handling of contingency funds has been defined.

The Project Manager is defined as the process owner for handling the contingency funds. A process is in place for managing these funds. The status and release of the contingency funds is a part of the Current Working Estimate tracking process.

12. Project management principles that define requirements for contractor project management programs on “turn-key” projects are in force.

The Contract Administration Manual covers in detail the requirements for the management of contractors performing construction projects or service projects. This procedure defines requirements according to accepted project management practices.

13. The role and responsibility of the Project Manager is clearly defined and understood throughout the organization.

Central Operations has a number of written Project Management procedures in place that define the role of the Project Manager. Liberty found these procedures did an excellent job of defining the role of the Project Manager. These practices were being consistently followed throughout Central Operations.

14. Expectations for project managers are consistent with the authority and resources given to that team member.

A number of written Central Operations Project Management procedures define the expectations of the Project Manager. Liberty found these procedures effective in defining the expectations of the Project Manager. These practices were being consistently followed throughout Central Operations.

15. Project management requirements for project participants are generally consistent across all projects.

Central Operations has a number of written Project Management procedures that define the project management requirements and procedures. These procedures appear to be applied consistently across all projects.

16. There is clear linkage between project management and the budgeting systems.

Liberty found clear linkages between project management and the budget systems. Central Operations procedure CE-0301 describes the budget responsibilities of the project manager.

17. The relative priority of projects and programs is properly defined in the planning and budgeting process.

The projects are defined and then ranked through a system of weighted attributes. A final review reconciles the approximation of the numerical system with the judgment of the managing authority of each business unit. The Project Manager has control over the resources after project approval and scheduling.

18. The construction program provisions for the collective management of small projects do not make fully-effective use of the project management principles used on large Central Operations projects. (Recommendation 3)

The detailed written project management procedures in Central Operations are required to apply to their projects, but are not required to apply to their programs. The bulk of the program work falls under Substation Operations, which does have provisions in place for the management of most of these programs. Some minor programs are managed by the regional field personnel. Other programs are managed by the Planning unit in Substation Operations.

Substation Operations Planning unit applies a “weak Project Manager” approach to program management. The group would benefit from establishing clearer lines of project management under a more structured and formal approach. The use of a defined, stronger program manager approach would add more structure. In addition, using the Project Engineer for these programs would provide better work process flow and schedule support. A pilot is underway to test use of the Project Engineer approach for some of the programs.

The benefits of a stronger program management process would lead to defined scope control expectations and program expectations. For the 2005 to 2007 period, there were 36 various programs in Substation Operations that were a total of \$45 million over budget.

19. The project management program applies to all organizations participating in a project.

Both the design and construction contractors used in Central Operations have management practices that are well defined. These processes align the contractors as a full participant in the project team and project management process.

4. Recommendations

1. Improve resource planning for design personnel and other essential project personnel.
(Conclusion 3)

The resource planning of the staffing levels of key project personnel such as project managers, project engineers, schedulers, lead discipline engineers, and other essential project personnel should be improved. The current staffing levels appear to be inadequate.

Liberty also found that resource planning of the staffing levels of the Design Engineering section needs improvement. Even with strong design process controls in place for the use of the outside A/E firms, the quality and timeliness of the A/E design packages are often cited in the Lessons Learned process at project close-out.

In addition to the resource planning for the levels of staffing, the system for scheduling and resource management of engineering and design resources should be reviewed and improved for optimization. The proper schedule planning of limited resources is crucial to avoid reshuffling of the resources from one project to another.

These staffing reviews should also provide the associated cost/benefits of any recommended changes.

2. Bring a corporate total holistic approach to cost management to the project and program management efforts. (Conclusion 6)

A total holistic approach to cost management would elevate effectiveness. This cost management concept and more detailed recommendations are covered in Chapter XII: *Work Management* of this report.

3. Strengthen Substation Operations program management processes by adding project management principles in a structured way. (Conclusion 18)

The detailed written project management procedures in Central Operations are required to apply to their projects, but are not required to apply to their programs. The programs in Substation Operations would benefit from clearer lines of project management in a more structured and more formal approach. In particular, the use of the Project Engineer would facilitate the design and scheduling of the programs requiring a multi-disciplined engineering approach. The more formal approach would provide better scope monitoring and control and improve the coordination of the outage schedules. The use of more consistent project management procedures may or may not drive the need for additional resources such as Project Engineers. This consideration should be a part of the staffing review.

D. Electric Operations

1. Background

Electric Operations is divided into four regions. These regions are assisted by an Engineering and Planning group. These organizations perform the bulk of the work necessary to plan, engineer, construct and maintain the electrical distribution system. These major groups are shown in the table below.

Group (# of personnel as of May 08)	Functions
Manhattan (1,152)	Plans, directs and controls the Manhattan electric distribution system
Bronx/Westchester (936)	Plans, directs and controls the Bronx/Westchester electric distribution system
Brooklyn/Queens (1,437)	Plans, directs and controls the Brooklyn/Queens electric distribution system
Staten Island and Electric Services (313)	Plans, directs and controls the Staten Island electric distribution system. Also includes the Transformer Shop and Meter Shop
Engineering & Planning (579)	Energy Services department provides gas and electric service extension to new customers. Distribution Engineering provides distribution design standards and engineering support for the regions. Planning & Analysis coordinates the development of the regional budgets.

The 2008 capital budget for Electric Operations is \$982 million. The table below lists the different types of capital work in Electric Operations.

Capital Work Type	2008 Budget	Description
New Business	\$144 million	New service extensions. Projects initiated by customer call-ins.
Burnouts	\$98 million	Capitalized portion of emergency replacement repairs, including UG primary cable, secondary open mains and OH facilities. Projects initiated by outage tickets.
Interference	\$31 million	Capitalized portion of interference repairs. Projects initiated by customer call-ins.
Improvement/Reinforcement	\$553 million	Planned region load relief and reliability projects. Projects initiated by regions.
Transformers/Protectors	\$144 million	Capitalized portion of transformers.
Meters	\$12 million	Capitalized portion of meters.

2. Findings

a. Overview of Project Management Process in Electric Operations

i. Overview

Many important factors separate Electric Operations and Central Operations in terms of project management needs. Electric Operations capital budgets principally include programs, which distinguishes them from the Central Operations capital budgets, which consist mainly of multi-year project. A project is a discrete scope of work with a beginning point and an end point. A program is collection of small projects occurring that comprise a long range scope of work (generally multi-year with established yearly accomplishment and budget targets). Central Operations work sites consist mostly of defined-point locations such as a substation, while Electric Operations work sites are often spread over the length of many miles of different feeders. Finally, Central Operations projects are under the control of one central substation owner and one transmission owner; in contrast, Electric Operations has four distinct and separate regional owners.

As a result of the differences listed above, the Electric Operations Project Management process below is being described as the generic process in use. It applies to projects and programs alike. There are also differences in how each region chooses to execute the process. Where necessary the regional differences are also described.

ii. Project Initiation

The initiation process of the work in Electric Operations varies with the type of work. Each region uses the same basic initiation process. Improvement/reinforcement projects comprise the regions' largest and most controllable project types. The process for reinforcement project initiation is different from the process for improvement project initiation.

Reinforcement work consists of discrete projects to provide feeder relief, transformer relief, and load transfers in relief of area substations. Regional engineering sections in the four Electric

Operations regions determine the need to increase capacity on the medium- and low-voltage distribution systems. The Regions' engineering groups conduct annual distribution system load relief and reliability studies to help determine specific system reinforcement needs. The studies incorporate recent summer peak load data, location-specific information about customer growth, and new construction expected in the coming year, and then overlay the projected demand forecast. The overloads, voltage problems, and other operating problems identified by the studies undergo analyses leading to corrective plan development. A final load relief plan identifies all reinforcement projects for each region. Distribution system reinforcement projects engineering and construction have the goal of completion before the start of the next summer period.

Methods to correct inadequate primary system conditions include replacement of limiting wire and cable, transfer of load to other feeders or networks, installation of capacitors or voltage regulators, and balancing load among the phases or legs of a feeder. Methods to correct inadequate secondary system conditions include installation of new transformers, reconnecting existing transformers to different feeders, reinforcement of secondary mains, and transfer of loads.

The improvement work consists of planned system improvements programs, such as Paper Insulated Lead Cable (PILC) replacement, UG secondary reliability programs, sectionalizing switches, remote network sensors, and network reliability programs. Engineering and Planning plan these programs over the course of the upcoming rate period. This program planning process determines the volume of work to be done in each region. Engineering and Planning assigns dollars for each program to each region. The regions subsequently determine the specific locations for the application of these funds.

Distribution Engineering in Engineering & Planning, working with the Regional Electric Operations organizations, reviews proposed programs/projects to determine prioritization for funding projects in the Electric Distribution (ED-1) capital budget, and ensures capital projects and programs alignment with the overall corporate priorities and corporate budget.

Annual capital budget development consists of three fundamental phases: authorization, appropriation, and funding. In essence, the authorization endorses the project or program, appropriation grants permission to expend or obligate funds for the project or program, and the annual capital budget provides the approved funding levels for the project or program for the coming year. The Board of Trustees approves the authorization levels and the annual capital budget. An appropriation request must subsequently gain approval from the required level of management (as determined by the Delegation of Authorities). Completion of these three phases, gives the regions the ability to begin the project or program.

Project or program appropriation pursuit comes after the authorization approval; a prior authorization in an amount equal to or greater than the appropriation request is a prerequisite to authorization approval. A partial or final appropriation request uses a "Request of Distribution Appropriation Form," supported by an appropriation package that contains: an estimate; a description of the problem, solution, alternatives, and other relevant information, and a property records ruling, to ensure proper accounting. Each package requires approval by the required level

of management. Upon approval, the appropriation grants permission to expend or obligate approved funds for the project or program.

iii. Project Planning

a. Load Relief/Reinforcement Projects

The major projects in Electric Operations typically comprise load transfer projects in relief of area substations. The preliminary 10-Year Area Substation and Sub-transmission Load Relief Program guides development of an original scope of work that lays out the number of feeders to be used, how far they need to be extended, banding, and the routes to be used. An order of magnitude estimate then follows, based upon the number of sections, the availability of manholes and conduits from Conduit and Duct Occupancy records. This order of magnitude estimate undergoes measurement against current unit costs. Then, an original project cost estimate is established and entered into the Five-Year Budget Plan.

Work commences on the layouts after the project becomes approved and part of the finalized 10-Year Load Relief Program. Conduit and structure layouts preparation comes first. These layouts are drawn as advances, and sent to survey to determine the final scope of work for the necessary conduit/manholes. Upon return of this information, the layouts are finalized and are estimated using the Division Operation Control System (DOCS). A partial appropriation is then prepared for this portion of work. Based upon the scope of work at this time, the overall project estimate is checked to ensure sufficient funding and may be adjusted up or down based upon the current scope of work. Next, the cable layouts are drawn and sent to planning for fielding. When these layouts are returned, the cable layouts are DOCS estimated and the final appropriation is prepared.

b. Improvement Program Projects

Preliminary estimates rely on projected volume and projected costs using current Property Record Account Numbers or unit costs. Following completion of summer load studies, the refinement of work volume and prioritization occur. The Chief Distribution Engineer in Engineering and Planning provides the regions with guidance on how to target these budgets for maximum impact. For PILC work, for example, the goal is to replace each year a percentage of cable as part of a plan eventually to remove all of it from service. Directing these annual cable replacements to specific networks allows for improvement in network reliability.

c. New business projects

Energy Services within Electric Operations has responsibility for facilitating project management associated with existing and new service requirements. The organization is divided into the four Electric Operations Regions. Project support and tracking form key elements in the process flow; Energy Services manages projects at the retail and major account levels. The 35,000 cases handled each year produce the installing of about 12,000 new services. There exist KPI goals driven by NYPSC mandates:

- Goal 1: issue every customer a service layout (Form 2-80) within four days
- Goal 2: serve every customer within 7.3 days once they are ready for service.

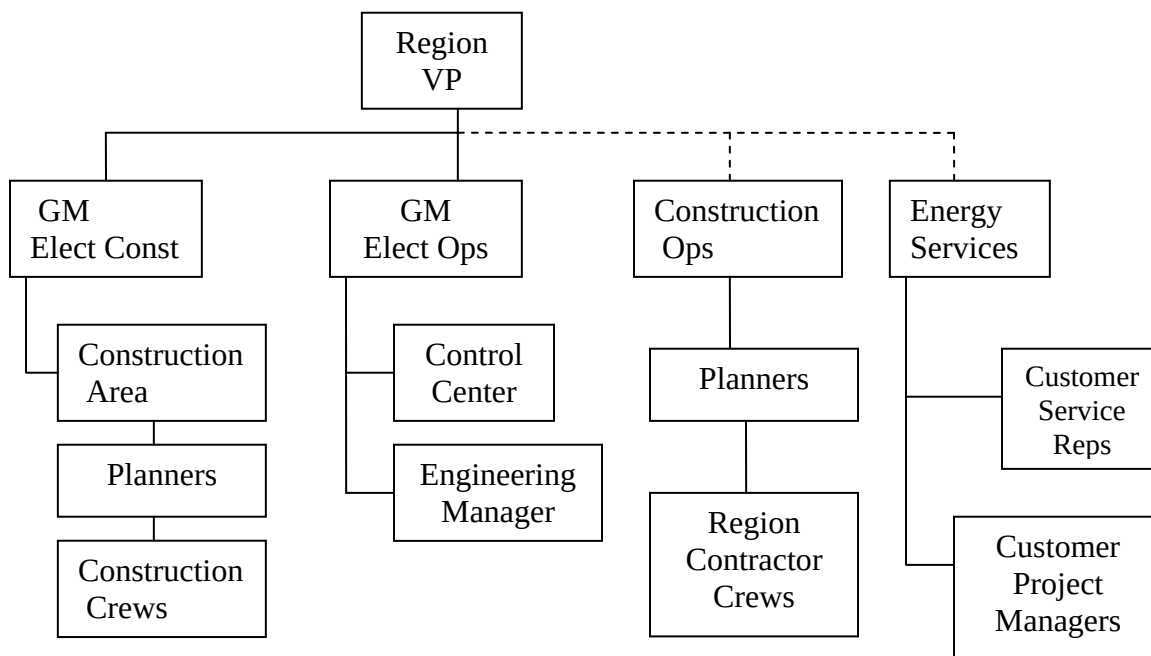
Customer Service Representatives provide membership for The Energy Services Retail Team. The Customer Services Representatives handle small jobs (less than 1,000 kW). Customer Project Managers comprise the Energy Services Major Team, which handles jobs over 1,000 kW. There were 170 large jobs was 2007. The Energy Services personnel get support from local engineering organizations in handling the technical requirements of new business design. Local electric operating organizations and Construction Management personnel have responsibility for field construction.

A new web application provides 26 percent of the customer service requests to Energy Services. The bulk of the remaining requests arrive by facsimile. A few large jobs arrive via a load letter format. Each application is time stamped, and sent to a Service Assessment Team (SAT). The SAT responds with the Form 2-80, if possible. This form gives the customer notification of service voltage, size, and type. SAT refers large jobs to the Energy Services Customer Engineering group. Other Energy Services groups (the Planning and Survey group and the Vault and Bus group) get involved as necessary for large-customer jobs. The system used for all services is CORS (Commercial Operations Request System). This old, mainframe DOS application uses defined case types with associated steps. When the case is loaded, CORS will provide the steps needed and the associated dates. The first step in CORS is known as “ruling the request,” which consists of identifying the work plan needed to meet the customer’s needs. The Customer Engineering group develops any necessary layout, and places it in eTRACS.

iv. Executing

a. Organization

A high level organization chart for a typical region showing the elements involved in electrical construction is shown below. The duties of the groups involved are:



Electric Construction

- Plans, directs and controls the construction and maintenance of the electric distribution system

Electric Operations

- Plans, directs and controls the operation of the electric distribution system and directs and coordinates restoration activities
- Plans, directs and controls design of additions, modifications, installation, removal and system reinforcements to the electric distribution system

Energy Services

- Plans, directs and coordinates the connection of new business to the electric and gas distribution systems in all regions except Staten Island
- Coordinates customer work needed to become compliant with companies' specifications

Construction Operations

- Part of the Construction group; provides contract support for the field regions in electric and gas operations with construction and contractor personnel located in each region
- Provides inspection services, conduit and manhole installations and excavations for region projects as requested
- Provides wiring and splicing services for secondary systems up to 208Y voltage for region projects as requested

Engineering Manager

- Provides engineering for the electrical distribution system in the region
- Maintains the mapping and modeling systems

Control Center

- Performs distribution dispatching functions within the region
- Coordinates and schedules feeder outage work within the region

Planners

- Plans and coordinates the work of their assigned construction crews to meet the scope and time requirements of each assignment

Customer Service Representatives

- For new customer jobs less than 1,000 kW, the CSR plans, engineers and coordinates the interconnection to the electrical and gas distribution system
- Functions as a single point of contact for new customers

Customer Project Managers

- For new customer jobs of 1,000 kW or more, the CPM plans, engineers and coordinates the interconnection to the electrical and gas distribution system
- Functions as a single point of contact for new customers.

b. Process

Each region uses similar, corporate computer systems to execute the work, including new business. For regions other than Staten Island, Engineering uses *Smart Layout*™ software to draw up the job in an electronic layout. These layouts are stored in the Project Wise document system. Smart Layout will also issue the final layout to eTRACS. eTRACS is a work tracking system that serves as a central repository for construction work. eTRACS interacts with the DOCS and CORS systems to share information.

Staten Island layouts are developed in the EDFIS engineering module of its EDFIS mapping system. EDFIS also interacts with DOCS to share information.

The Project Wise Document Management System serves as a centralized document management system that allows for control of items such as preliminary and final layouts, vault sketches, survey drawings, and other project documents. Project Wise is used by the three larger regions and Energy Services to view and store layouts. Layouts are stored there by region, year, and type of layouts. The designers are able to save different revisions of the layouts, which creates a historical record of any changes. The job ID is the parent. The layout can have different components called parts or tasks. The task layouts have a fly sheet portion with DOCS codes that reference the Associated Work Unit (AWU) in DOCS. The layouts for major projects can be quite large. For example, the Parkview substation distribution project had over 300 parts. It comprised a 120 MW load transfer. For a large job such as this, overview tracking drawings, called “bed sheets” are made. Layouts are created in Smart Layout software, and then issued through eTRACS.

eTRACS sends the work notification to the designated work crews. Persons assigned a task on an eTRACS layout get an e-mail upon issuance of a new layout. Responsibility for different portions of an eTRACS layout may be spread among different work groups. These layouts provide a consistent view for all types of work. Each layout has a description, account numbers, and a fly sheet that lists tasks. Each task item is assigned to a specific organization. There are no schedules for these tasks, except for than information contained in the general comments section about the overall work description.

The eTRACS layouts interface with DOCS. Work control and monitoring takes place through the DOCS system. All DOCS work-control functions are performed on-line. Electric Operations crews complete a Daily Crew Activity Report (DCAR). The DOCS system extracts data from the DCARs.

A guideline budget is prepared in June of each year. Based on this guideline budget the layouts are prepared at the end of the year. All of a region’s planned layouts are generally prepared and entered in eTRACS by the first of the year. Work Planners can then begin scheduling and installing work with their crews.

v. Monitoring and Controlling

a. General Process

The work layouts in eTRACS contain the scope of work to be performed. They do not contain any schedules that can coordinate the flow of the work among the various work units. A committee management process addresses scheduling. Each region has a Major Projects Team responsible for the execution and coordination of the budget items. They coordinate projects through Major Projects Team meetings. The Major Projects Teams are cross-functional teams consisting of representatives from budgeting, electrical construction (including UG, cable, and Construction Management), Control Center, Energy Services, and Public Improvement. Work planners from the various construction units are also represented. The Team tracks progress, schedule, and other issues on all major projects using an Excel spreadsheet. The tracking is by the PRANO budget units. Engineering retains all budget responsibility.

Major Projects Team meetings take place weekly, biweekly or monthly intervals. The Teams use an Excel spreadsheet for managing items such as schedules, items to be completed, work progress, permits, survey work, and planning. The team plans, schedules, and tracks the work.

b. Manhattan Region

One person in the Manhattan Construction Operations department has been assigned full time as the Project Manager for the Manhattan Region. The Manhattan Project Manager has the responsibility to get the major projects constructed.

Manhattan previously used an Access™ database to monitor the work. In the winter of 2006 they began also using Microsoft Project.™ Their basic scheduling template includes design, build, wire, and connect modules. They build about 20 to 25 new vaults for network transformers a year in Manhattan. Construction Management does the construction. Manhattan links schedules with the Construction Management schedule for the build portion of the vaults, using an individual schedule per vault. The vaults often involve weekend or night work to accommodate municipal requirements. The schedule system allows them to start giving their Manhattan construction crews dates due, a development that is new to the crews.

The Manhattan Control Center manages all of the cable replacement projects, given their involvement in the feeder scheduling outages. The job must only involve cable replacement for it to be managed by the Control Center. These jobs include cable replacements due to burn-outs, PILC, and load relief. They use an Excel™ spreadsheet with about 20 tabs to manage this work.

c. Bronx/Westchester Region

The cross functional committee team is called the Load Relief Team. This team starts meeting at the end of the year, and convenes twice a week. One meeting is held in the Bronx and the other meeting is held in Westchester. June 1st is the due date for all of this work to be completed. One person is assigned annually as the Team Leader for coordinating the Load Relief Team and their work.

d. Brooklyn/Queens Region

The Brooklyn/Queens major work schedules are set by the feeder outage schedules managed by the Control Center. The Work Planners in Brooklyn/Queens receive the outage schedules and then backload a work schedule to meet the outage dates. The Work Planners create this schedule in *Microsoft Scheduler*TM. The Team meets every two weeks to discuss status, needs, capabilities and progress. This team coordinates the major load relief projects and also large programs such as the PILC replacement.

e. Staten Island

Staten Island is a much smaller region than the others, which allows for more individual attention to the projects. In 2007 the Staten Island Engineering Manager managed and tracked the major projects using *Microsoft Project Schedule*TM. They looked at percent complete and compared to percent of budget expended. They held monthly project meetings.

The Staten Island General Manager hired a full-time Project Manager on July 2008 for the region. This individual will have responsibility for capital projects. The Project Manager, who will be involved after the project is conceived by engineering, will maintain a schedule using *Microsoft Project*TM and a CWE for the project if the cost is over \$100k. The Project Manager will also assure that the project is constructed according to design.

f. New Business

The small new business jobs are managed by the CSRs through the CORS system. These jobs are usually completed on a rapid schedule. The customer provides CECONY with an “interim inspection request” after they extend the building conduit. The CSR inspects the job, and then gets Construction Management to install any necessary duct. The duct will be installed and ready for wire pulling in what is known as a *roped and rodde*d configuration. In recent years, for secondary cable up to 500 MCM size, CECONY has been using Construction Management to pull the cables, if their workload allows. Service extension actually takes 3 to 4 weeks (permits are 5 to 10 days, then mark outs for locates and then alternate street parking timing); therefore the goal is to do all work possible before the customer is ready. When ready, the customer must give a “final checklist” to trigger the final service requirements. CECONY will then tap up the cables and close out the job electronically. The CSR will then perform a validation procedure to verify the new account is set up and any deposits are collected.

For the large projects, the CPM also uses the CORS system. CORS tracks the job from start to finish. Electronic handoffs are done thru CORS.

Transformer vaults are a CECONY responsibility. The CPM coordinates the installation of these vaults. The CPM seeks to get developer agreements in place for the developers to install the vault to CECONY specifications. CECONY pays the associated costs. The developer agreement specifies work scope, specifications, and costs. The developer must get final NYDOT approval for the vault. Network protectors are always installed above grade and street level vaults are installed below grade. CECONY supplies the transformers and network protectors for all installations.

In order to determine the annual budget requirements, Energy Services starts with known major projects for the upcoming year. Several major projects models are in place. Pending jobs are run through the models to determine the approximate PRANO elements required. The PRANO elements determine the annual budget. Completion of the actual layouts produces codes that allow the actual elements to become known. The field unit codes of the work performed is reported through the DCARs. Progress measurement comes through comparison of actual to budgeted PRANO elements.

g. Common Budget Monitoring Processes

Following authorization and appropriation, a number of controls monitor expenditures. Three groups (Corporate Accounting, Planning and Analysis, and the business units) review capital expenditures versus the monthly and the year-to-date annual budget on a project, program, and overall basis. Corporate Accounting prepares, issues, and distributes to appropriate Company personnel a monthly capital budget status report. This report provides information about approved budget amount and actual expenditures, and explains significant variances. It goes to the officers responsible for the operating areas and other appropriate Company management, to allow expenditure oversight.

Based on the analysis of the year-to-date variance to the budget, the annual Capital Budget can be adjusted at two junctures during the year (the First and Second Reviews). This process allows the Company to adjust the current budget, depending upon the priority of projects, in order to control costs and meet desired work plans. If the revised budget runs more than 5 percent over the approved annual budget, the Board of Trustees must approve the change.

Corporate Accounting monitors variances among the authorization, appropriation, and expenditure levels on all individual capital projects and on the overall capital budget funding level. Project managers and local organizations have responsibility to monitor expenditures and ensure that they remain within approved levels. If costs are projected to exceed approved limits, project managers and local organizations must obtain required approvals. Financial Forecasting and Corporate Budgeting also monitor expenditures versus approved appropriation levels, and notify the responsible Program Manager if actual variances require additional approval. Projects cannot exceed levels of authorization and appropriation without further review and approval.

h. Construction Operations

Construction Operations has about 800 contractors performing street work in the regions. The region program managers decide what work is to be done. Construction Operations provides the regions with unit costing for their contractor workforce. 90 percent of their work involves capital construction in the streets. The contractors are comprised of various building trades. They perform excavations, manhole installation, and some limited cable pulling. The Construction Operations Planners work with the regions on work scheduling. Construction Operations develops milestones schedules used to plan work.

The Construction Operations staff is constant. The contractor force varies to manage the peaks. The managers in each region normally have multiple contractors working. In addition they have

unit-price, ladder contracts with other contractors, who can be used as necessary. There is some limited movement of contractors among regions.

Construction Operations works with Energy Services on new business connects. Most of this work involves installing conduits and manholes. They also install some secondary cable, but no splicing work. The type of jobs they do for Energy Services are mostly small jobs completed within 30 days.

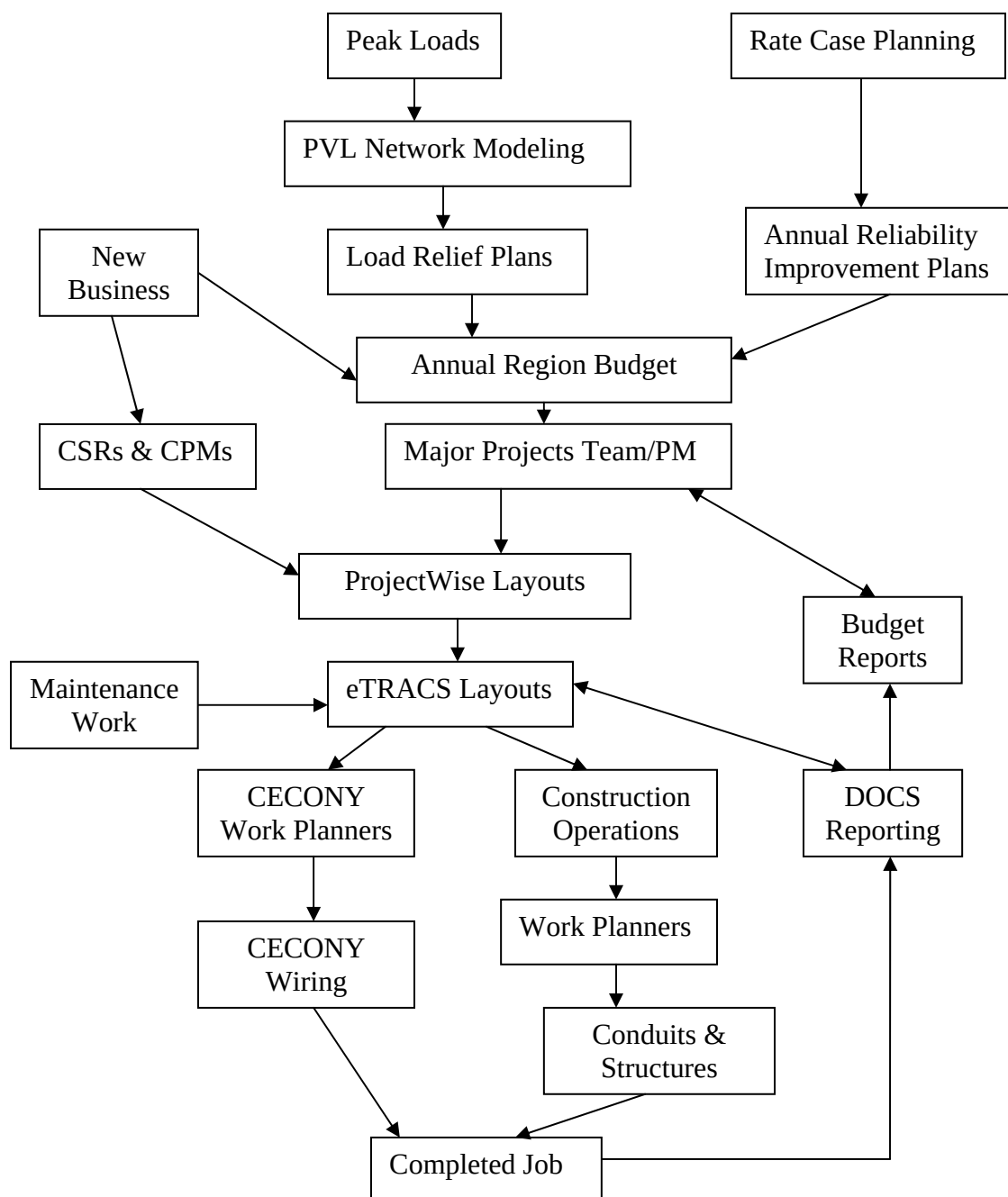
The regions and the other user groups control the budgets. Construction Operations charges its work to these budgets. Occasionally, usually in the later part of the year, they will be asked to back off of non-critical work in some areas. Construction Operations manages the unit costs to keep them within limits. They use an internal monthly report that provides the number of units worked and the cost per unit.

vi. Project Closeout

Distribution work undergoes are no formal close-out reviews. Distribution work is mostly production work. Any feedback is on-going during the year for distribution projects. When a project is closed out, the mapping records update is one of the most important aspects.

vii. Project Management Process Flowchart

Figure XIII.5-



b. Project Management Process Structure

i. Project Management Program

The eTRACS system contains the work layouts that define the scope of the work. As the work is completed, the DOCS reporting system track the costs. No overall work management system links work scope, schedules, and cost. Capital and O&M programs are managed through a collaborative process among the regional engineering groups lead discipline engineers, the control center feeder scheduling groups and the Construction group's Field Operations Work Planners.

No written procedures or expectations address the management of the collaborative process. With no overall work management system available or written procedures in place, all of the regions have developed their own differing work-management process. Section C.2.a of this chapter describes how these processes work.

There were a number of pre-2005 organizational and process changes to facilitate project management:

- Implementation of Project Wise Document Management System: a centralized document management system that allows for control of items such as preliminary and final layouts, vault sketches, survey drawings, and other project documents. By standardizing the use of Project Wise, electronic distribution of important documents reduced delays and associated costs, and promoted increased awareness of the status of each project design across the Company.
- Implementation of the Planning and Analysis Section in Electric Construction: this section, working closely with Regional Electric Operations Engineering and Regional Electric Operations Construction, coordinates the execution of system reinforcement and relief work within the Region.
- Implementation of the Planning Group in Construction Management: this group, working closely with the Electric Operations Engineering and Energy Services groups, helped efficiently plan and coordinate the work of trenching contractors, prioritized work, obtained permits, and ensured that completed work packages were submitted to the regional Construction Operations groups as efficiently as possible.
- In addition, the expansion of the centralized Planning and Analysis group has helped in the development and increased utilization of tools to monitor productivity and unit costs, furthering the development of the budgeting processes and improvements in the accuracy of our field reporting.

These incremental improvements have helped; however, an overall work management system (a fundamental system for effective management) remains lacking. Different computer systems must be individually queried and analyzed to gather the information necessary to manage a large project. This fundamental gap was mentioned in three separate interviews with CECONY personnel.

New-business work-management process have revolved around the CORS tracking system. In February of 2008 work began with a process manager consultant (VESPOKE) on a project called

Energy Services Major Customer Process Management. The introduction to the proposal for this project stated:

While CECONY uses a range of engineering systems to support the design and delivery of the service, there is no truly effective system support to the management of the process that allows both detailed management of individual projects and high level control and management of all projects.

VESPOKE flow charted the process as a first step. It next will develop software that will handle steps from identifying the job, to modeling the process, to providing GNATT charts of the schedules. The intent is to provide the schedules to construction to guide installation. In effect, this represents the development of a work management system dedicated to new business. The goals are to improve the timeframe and schedules, identify the resource requirements, provide notifications of work assignments, and minimize opportunities for missed handoffs.

CECONY management has recognized the overall need for a work management system in Electric Operations. CECONY is currently planning on commencing assessment of an Electric Operations work management system in 2009. A full time team will be dedicated to this effort. The team will conduct the planning and analysis necessary to finalize a business and technology strategy for processing work within Electric Operations. This study will encompass all work processed by Electric Operations including:

- Emergency repairs
- Maintenance and inspection
- New business
- System reinforcement and load relief.

ii. Project Manager Team

CECONY uses a collaborative process among the regional engineering groups' lead discipline engineers, the Control Center feeder scheduling groups, and the Construction group's Field Operations Planners to manage capital and O&M programs. After receiving authorization to proceed with the approved project, the receipt of engineering drawings by the regional construction groups commences the construction process. The Regional construction groups plan and organize the manpower and materials for the field work, in order to meet the scheduled completion dates. Field Operations Work Planners act as Project Managers to oversee day-to-day progress projects, while the operating area managers fill the construction manager role. Each project is assigned field supervisors responsible for the management oversight of the project and people to perform the various tasks.

iii. Dedicated Project Support Resources

Electric Operations project work load consists mainly of annually budgeted programs for system reinforcement or reliability. Several projects such as area substation load transfers are multi-year projects, but the vast majority of the work consists of ongoing annual program work. Electric Operations personnel perform such work as a routine part of their normal functions.

The Engineering Departments in each region provide many project support resources. Each region engineering department is organized slightly different. Some of the units in these engineering departments are:

- Design or Primary Design: Responsible for the design of the primary feeders. Includes 27 kV, 4 kV and the auto loops. They are responsible for the feeder loads and reliability. They also coordinate the feeder designs for new business extensions.
- Mapping & Secondary or Secondary Design: Responsible for network transformers and secondary mains. Processes as-built mapping changes. Monitors network transformer system on a day-to-day basis. Runs PVL model. Gives planners guidance on items to fix the network.
- Reliability: Responsible to monitor networks and non-networks, reliability indices, and prioritizing the network reliability items.
- Field Engineering: Works with all the other engineering design groups. Does the field checking. Performs infrared inspections of OH systems on a periodic basis. Performs manhole inspections.
- Operations Engineering: Works closely with the region Control Center. Does real time engineering to assist control.

The resources in these various units provide any estimating, scheduling, and cost engineering resources required in support of large projects. In addition, Distribution Engineering provides the regions with program guidelines on application and implementation.

iv. Management of O&M Programs

Significant O&M efforts will often require cross-functional participation. In Electric Operations the major O&M efforts include transformer inspections, structure inspections, tree trimming, overhead equipment maintenance, and obsolete cable replacement. Each region has a unique system of managing these projects. Management usually consists of assigning an overall leader and performing project tracking on spreadsheets, using data extracted from various systems.

The extensive underground distribution system at CECONY makes inspection and maintenance tracking a critical O&M effort. There exist detailed procedures for conducting these inspections; that are maintained centrally by Distribution Engineering. Two entirely separate systems store inspection data. Procedure EO-10110, titled Inspection and Maintenance of Network Type Distribution Equipment, uses a system called CINDE (Computerized Inspection of Network Distribution Equipment) for data storage. Procedure EO-10359, titled Periodic Underground Distribution Structure Inspections, uses a system called EDIS (Electric Distribution Inspection System) for data storage. These systems could provide better project management if they were able to communicate and exchange data with each other.

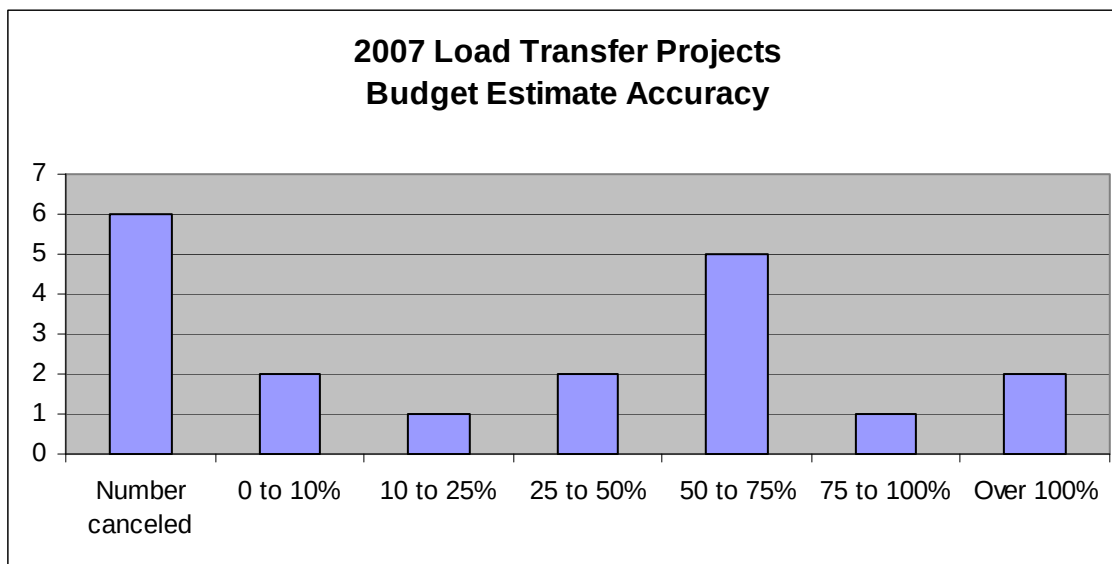
v. Project Initiation and Approvals

Estimating accuracy comprises an important facet of proper project management. Without an accurate baseline cost plan, it is difficult to monitor and control the overall project costs. One factor affecting estimating accuracy in Electric Operations is the DOCS unit system of costing.

The DOCS system of budgeting uses unit pricing. For budget purposes, the PRANO units operate as high level “counter codes.” A “counter code” is an Electric Operations work management or DOCS field reporting work unit code used to define a “stroke count” for all Electric Operations field activities. The DOCS work unit counter code is the unit of measure reported in actual and budget unit cost or hours per unit reporting. Only a few of 94 PRANO codes are commonly used for budget estimates. The regional project tracking sheets use about seven PRANO codes to track all work. These PRANO codes identify items such as vaults, structures, primary spans, conduit sections, transformers, and secondary sections. CECONY uses them to develop the budget amounts. Because these are high-level codes, budget amounts derived from their use are necessarily order of magnitude estimates. Because the budget estimate is an order of magnitude estimate the actual costs can vary greatly.

When the actual layouts are done to define the work to be constructed, the detailed DOCS field codes are used. Hundreds of DOCS field codes describe the work in detail. A primary span, for instance, will be described in a detailed DOCS unit by its size, number of phases, and length.

Liberty analyzed some details of the 2007 area substation load relief project estimates. This data illustrates the level of estimate accuracy. These projects were selected because this work is under the control of regional engineering. Weather, emergency response, and variations in new business affect these projects somewhat. The 2007 budget included 19 substation/load transfer projects. A preferred estimating accuracy would be 10 percent, which is the contingency level that CECONY applies. An accuracy of 25 percent would be barely acceptable. Very few of the projects fell within either metric.



Another phenomenon illustrated by this group of projects is the number of canceled load transfer projects. Liberty believes that the high number of cancellations resulted in major part from the fact that the rate case timeline front runs the budget timeline. The 2007 projects were based on the June 2006 budget guidelines, which in turn were based on the 2005 summer peak loads. When the summer peak loads of 2006 were analyzed, six of the nineteen projects were able to be canceled. None of these canceled projects had caused any actual expenditure. This data is shown

in the table below. In addition to the canceled projects several others had revised schedules or scopes, which affected the actual cost expenditures.

Number of 2007 load transfer projects	19
Budgeted amount of all projects	\$48.7 M
Actual amount spent	\$58.5 M (120%)
Number of canceled 2007 projects	6
Budgeted amount of canceled projects	\$5.6 M (11%)

Because the budgeted amount includes entries for the canceled projects, the actual magnitude of the 2007 project expenditures compared to budget would be 120 percent plus 11 percent, or 131 percent.

c. Project Management Knowledge Areas

i. Application of Cost Management Methods

The holistic approach to cost management requires a shift in approach from an accounting-focused perspective to a results perspective that concentrates on the work itself. Process controls would tend to be proactive and occurring real time in the management process. Liberty found mixed results in Electric Operations in this area. We noted some aspects of proactive process control; others were subjected only to accounting-oriented oversight.

Some examples of a proactive approach to holistic cost management are:

- The jeopardy network modeling process to better target the program dollars
- For the load transfer projects shown in section C.2.b of this chapter, the flexibility in responding to the more recent load data.

Some aspects of an accounting oversight only are:

- The capital budget KPIs are at the overall total Electric Operations budget. There are no concerns exhibited over meeting any of the lower level budgets that make up the overall capital budget.
- The lack of scope control for many of the major programs. See section C.2.c of this report for detail.
- The lack of accurate budget estimates on a project level.

ii. Cost Management Planning for Major Work Components

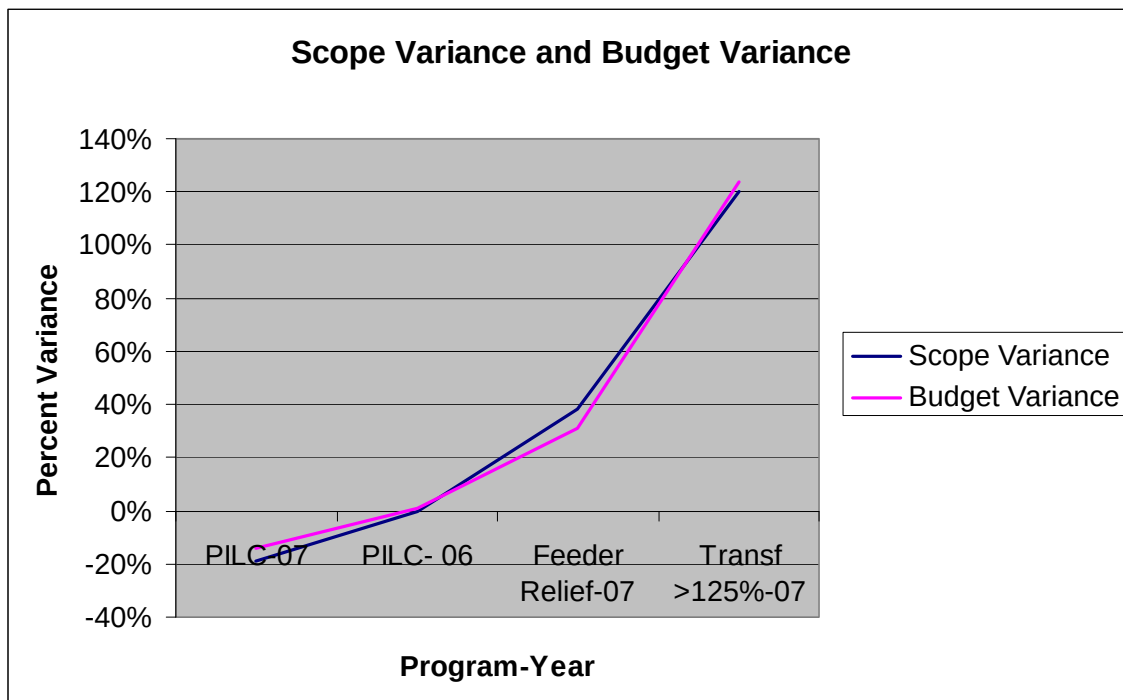
The bulk of program planning originates in Distribution Engineering. Under the direction of the Chief Engineer, rate case planning takes place for major programs. This planning describes the baseline costs and the justification for the work. The overall cost is then apportioned to the four regions. Identifying the cost manager for the implementation of these plans is left up to each region Engineering Manager. There is no central control over the cost management of these programs in the execution stage by Distribution Engineering. There are no written expectations for the execution of these programs by the regions. As shown in the data in section B.2.e of this chapter, the programs have frequently run over budget.

iii.. Exit Ramps for Large Projects

The large projects in Electric Operations are associated with the area substation load transfers. The distribution work for these projects is delayed or accelerated as the substation in-service date varies. The remaining work in Electric Operations is program work that is spread out among many feeders. There is no need for project exit ramps to control costs. The cost control is managed by controlling the number of units of work, or the scope control.

iv. Scope Control

For the programs in Electric Operations involving many units of work among many different feeders, the control of the number of work units directly controls the scope. The data for several of the main programs is shown in section C.2.e of this chapter. Using this data for several of the data points, the graph below shows the scope variance (number of units) and the budget variance. There is a direct correlation between the scope control variance and the corresponding budget variance.



v. Quality/Cost/Schedule Relationships

Overall Liberty found that the role of quality and its relationship to cost and schedule is adequately understood by project management participants. Inspections and monitoring systems assure quality of work performed by company and by contractor forces.

vi. Process for Contingencies

The Company's policy in the Electric Operations Engineering organization, which handles engineering estimates on distribution projects, is to apply 10 percent contingency to appropriation estimates, which follows the previously discussed Stanford Institute for Economic Research Paper. The Electric Distribution Engineering organization develops estimates for distribution projects that are generally one year in advance. These projects are generally short in duration (one year or less).

vii. Project Management of Contractors

The Construction Management departments in the Central Operations Construction group support construction in the areas of steam, gas, power plants, and the electric regions. They provide the Construction Managers for the major projects in these areas. It is a contractor based workforce. They manage about 1,500 contractors, with about 800 of these contractors involved with the regions in street work. They are currently managing about \$500 million in contracts.

The region program managers decide the work that is to be done. Construction Management provides unit costing of their contractor workforce to the regions. 90 percent of this work is capital construction in the streets. Their contractors are laborers, not electricians, performing work such as excavations, manhole installation, and some limited cable pulling. The Construction Management Work Planners work with the regions on the work scheduling. Construction Management develops milestone schedules that they use to plan the work. They also manage their unit costs to verify that they are within range. They use an internal monthly report that provides number of units worked and the cost per unit.

There is also an Electric Operations section in Construction Services in the same Central Operations Construction group. It works entirely in the regions. There are approximately 129 CECONY people in this section. This group functions as a separate work contractor for the regions. They work on secondary distribution lines up to 208 volts only. They do manhole inspections, streetlight work, new business connects, and burnout repairs. They work under the direction of Electric Operations personnel. Their work is reported through the DOCS and eTRACS systems. They export the region information to an Excel sheet for better viewing. In addition, the Construction Services Work Planners take the customer schedule information and maintain their own independent detailed work schedules in Microsoft Project. They also monitor their unit cost rate. They track the unit cost of every operation. They also maintain their separate independent estimate tracking on their services.

d. Organizational Culture and Capabilities

i. Definition of Project Manager Role

No written procedures address the Project Manager role in Electric Operations. Many projects within Electric Operations are completed as part of an overarching program. At this expanded program level, the scope of project planning and management increases to encompass a larger group of active participants, such as additional engineering, Control Center, and financial planning support. The number of groups involved in project planning and management effectively varies by the scope of the program or project. For example, New Business projects are monitored and controlled by Customer Project Managers for large scale new business projects, while smaller New Business projects are managed by Commercial Services Representatives.

Ongoing capital and O&M programs are managed by lead discipline engineers in region engineering. They coordinate work, and serve as the project managers. Lead discipline engineers assume responsibility for the project engineering functions while operating organization personnel including planners act as project managers and operating area managers or supervisors fill the construction manager role.

In defining the role and responsibility of the Project Manager, CECONY offers in-house training courses on project management and *Microsoft Project*™ scheduling. Lead discipline engineers, work planners and other personnel may act as Project Managers under the group approach. The table below shows the numbers of regional Electric Construction and Electric Operations personnel that have taken this training within the past three years. Included for comparison are the number of Construction Management and Construction Services personnel and Distribution Engineering personnel that have taken these courses. Generally the number of regional personnel taking these courses has been low compared to other groups. Also of note is the low number of Energy Services personnel that have taken these courses.

Electric Operations Project Management Training

	Basic PM (3 days)	Advanced PM (5 days)	Microsoft Project
Brook/Queens Elect Const & Elect Ops	16	1	6
Bronx/Westchester Elect Const & Elect Ops	6	4	3
Manhattan Elect Const & Elect Ops	4	5	0
Staten Island Elect Const & Elect Ops	1	1	0
Energy Services	2	1	1
Construction Management & Services	34	19	21
Distribution Engineering	22	1	0
Total CECONY Employees	262	103	91

ii. Project Manager Expectations and Resources

There are no written Project Manager expectations in Electric Operations. Therefore, any job expectations would have to be developed between the respective region General Managers and Section Managers.

iii. Consistency of Project Management Requirements

There are no written Project Manager requirements or procedures in Electric Operations. Therefore, any job requirements or procedures would have to be developed between the respective region General Managers and Section Managers.

iv. Project Management Budget Linkage

There is linkage between the project management process and the budget systems in Electric Operations; however, it could be improved. The DOCS estimating system is now only used to provide an order of magnitude budget estimate. The actual detailed estimate for appropriation and construction could vary greatly. In addition, the DOCS unit price estimate includes both the material and labor in one unit. Discerning whether a unit change is due to material or labor fluctuations is not readily apparent. The lack of an effective work management system is a main item that could both improve the linkage and the quality of the estimating system. This work management system is discussed in detail in section III B 2 (a) of this chapter.

v. Project Priority Management

Distribution Engineering in Engineering & Planning, working with the Regional Electric Operations organizations, reviews proposed programs/projects to determine prioritization for funding projects in the Electric Distribution (ED-1) capital budget, and ensures the capital projects and programs are aligned with the overall corporate priorities and corporate budget. The priorities are then sorted into a high, medium and low category.

In prioritizing electric distribution system load relief projects into the high, medium and low ranking categories, Distribution Engineering considers the relative importance of the overloaded facility in terms of potential system performance impact and the degree of the projected overload. In terms of system performance impact, facilities are ranked in the following order (from highest to lowest potential system impact):

- Area Substations
- Primary Feeders
- 4kv Substations
- 4kv Feeders
- Transformers & Secondary
- <\$100K Load Relief
- 27kV and 33kV Shunt Reactors.

The prioritization of reliability programs and projects for the networks considers the reliability index rank of the network, the nature of and the expected degree of improvement in network

performance, and the cost of the work. The prioritization of reliability programs and projects for non-network load areas considers the nature of and the expected degree of improvement in performance, and the cost of the work. These considerations include the following:

- Impact on SAIFI
- Impact on CAIDI
- Impact on customer satisfaction
- Cost benefit analysis.

The prioritization of reliability programs also reflects rate case commitments and regulatory requirements, such as the PILC cable and stop joint removal and manhole cover replacement. Once these priorities have been approved the Project Manager does not have to compete for the resources.

e. Project Management Applied to Program Management

i. Collective Management of Small Projects

In Electric Operations many of the capital and O&M improvement and reliability items are better described as programs rather than projects. A project is a discrete scope of work with a beginning point and an end point. A program is collection of small projects occurring annually to meet the objectives of a long range scope of work. Electric Operations manages these programs in the same manner as it manages the load transfer capital projects.

The table below lists the data for 2006 and 2007 on some of their major programs.

PILC (UG Conductor)			
	Budget	Actual	Variance
2007 Costs	\$19,072,000	\$16,320,000	-14%
Units	1,184	960	-19%
Cost/unit	\$16,100	\$17,000	6%
2006 Costs	\$19,480,000	\$19,709,000	1%
Units	1,291	1,294	0%
Cost/unit	\$15,090	\$15,231	1%

Feeder Relief			
	Budget	Actual	Variance
2007 Costs	\$39,194,000	\$51,350,000	31%
Units	888	1,227	38%
Cost/unit	\$44,137	\$41,849	-5%
2006 Costs	\$38,487,000	\$51,679,000	34%
Units	841	1,406	67%
Cost/unit	\$45,736	\$36,756	-20%

Transformer Relief >125%			
	Budget	Actual	Variance
2007 Costs	\$17,133,000	\$38,321,000	124%
Units	136	299	120%
Cost/unit	\$125,978	\$128,164	2%
2006 Costs	\$11,161,000	\$23,774,000	113%
Units	174	166	-5%
Cost/unit	\$64,144	\$143,217	123%

Some observations about this data are:

- PILC: Costs have been within budget. The 2007 work accomplished (number of units) was not as much as planned.
- Feeder Relief: Lack of scope control of the number of units worked has resulted in a corresponding budget variance.
- Network Transformers >125 percent: For 2007, the lack of scope control of the number of units worked has resulted in a corresponding budget variance.
- In some cases there is a big difference between the budgeted DOCS unit rate and the actual DOCS unit rate.

The bulk of the planned program work is contained in the Electric Operations system reinforcement budgets. Actual expenditures are only marginally affected by weather, emergency response or variations in new business activity. The recent data for this entire budget is shown below.

Electric Operations System Reinforcement Budget			
Year	Actuals	Original Budget	Variance
2005	\$190M	\$203M	(\$13M)
2006	\$282M	\$260M	\$22M
2007	\$438M	\$387M	\$51M

As a total group for the past three years the system reinforcement programs ran \$60M over budget.

ii. Application Across All Organizations

The general process for the management of the region contractor workforce is discussed in detail in C.2.a of this report. The project management of contractors is also discussed in detail in section C.2.c of this report. These processes align the contractors as a full participant in the project team and project management process.

4. Conclusions

- 1. A project management program is in place, but it does not address all of the elements of project management. (Recommendation 1)**

The Electric Operations project management program is currently a collaborative process between regional engineering, control centers and the construction units. There are no defined roles or written procedures in place for this process. This process has been a result of filling the gap produced by the lack of a work management system. There is no overall work management system in place to link work scope, schedules, and cost. A system is needed to allow for detailed project management of an individual and at the same time allow for high level program management and control. A work management system would also support other important processes such as material accounting, cost accounting and crew resource management.

2. A team of project managers is not in place. (Recommendation 2)

Capital and O&M projects and programs are managed through a collaborative process in the regions. There are no defined project manager roles. This is mainly the result of filling the gap created by the lack of a work management system tool. For the large capital projects such as area substation load transfers and for the overall program management of large programs (such as the PILC, primary feeder relief, network transformer overload, secondary open mains, etc.), a strong project manager and program manager role is desirable to provide scope, schedule and budget control. Written project management procedures should be put into place to provide structure and expectations.

3. Large projects are provided with dedicated support resources, including planning, scheduling and cost engineering skills.

With the exception of the area substation load transfers, the vast bulk of the work done in Electric Operations is ongoing program work. This work is handled as a normal functional assignment by the Electric Operations personnel. The Engineering Departments in each region provide many project support resources. In addition, Distribution Engineering provides the regions with planning support and program guidelines on application and implementation.

4. The project management principles that are being applied to significant O&M efforts could be improved with the use of a work management system tool. (Recommendation 1)

In Electric Operations the major O&M efforts are items such as transformer inspections, structure inspections, tree trimming, overhead equipment maintenance and obsolete cable replacement. Project tacking is usually done on spreadsheets using data extracted from various systems. This management would benefit from the use of a work management system tool that would allow detail information viewing and also overall program management.

The underground maintenance inspections are a major O&M effort. Currently there are two separate inspection systems used for managing and storing data (CINDE and EDIS). Both of these systems have detailed written procedures and processes in place. These systems could provide better project management if they were able to communicate and exchange data with each other.

5. Formal approval and kick-off of projects is not permitted without a reasonably firm scope definition, but the cost estimate is generally only an order of magnitude estimate. (Recommendation 1)

The scope definitions for major projects in Electric Operations are reasonably firm. For an area substation load transfer, the scope is defined feeder work necessary, amount of load transfer goal and general plans for the execution of the work. Program scopes are defined by the number of units of work.

The PRANO DOCS categories used for budgeting are high level codes that are order of magnitude estimates only. While order of magnitude estimates are acceptable for planning purposes, the budget estimates should be more accurate. The detailed DOCS estimates for the Request for Distribution Appropriation are more accurate, but they often do not correspond with the budgeted amount. This leads to a loss of level of visibility of the individual project budget. Budgets are generally then forced to be managed at an aggregated total level such as the Improvement and Reinforcement category.

6. Some of the philosophies, principles and methods of holistic cost management are not being applied in the project environment. (Recommendation 3)

Liberty has observed some aspects of holistic cost management in Electric Operations. The jeopardy network modeling process to target the program dollars is real-time and proactive. However there are a number of aspects that are missing. A lack of program scope control has been observed. A lack of accurate budget estimates on a project level has been noted.

7. Cost management plans for major components of the work are not in place. (Recommendation 2)

With the exceptions of area substation load transfers and large new business projects, the major work components in Electric Operations are contained under their program umbrellas. The program planning starts off on a sound basis in Distribution Engineering with rate case planning which describes the baseline costs and the justification for the work. The costs are then proportioned to the regions for execution. There is no written cost plan for managing these programs or any central control. Budget overruns on the programs are frequent. Written program management roles and expectations need to be put into place to provide the basis for the program cost management process.

8. Large projects contain “exit ramps” to permit management reconsideration if costs begin to escalate.

Liberty feels there is not an issue with stopping or delaying projects if costs or other issues arise.

9. A program of scope control that identifies scope deviations early and analyzes and mitigates their effects is not in place. (Recommendation 2)

For major programs such as PILC replacement, primary feeder relief and network transformer replacement, there is a direct correlation between the scope variance and the budget variance. Overall there is a lack of scope control on these programs. By scope control Liberty refers to the actual number of work units installed as compared to the budgeted number of work units. On the project level, this is not in line with the corporate concepts of plan the work and work the plan.

10. The role of quality and its relationship to cost and schedule achievement is clearly defined and understood by all participants.

Overall Liberty feels that the role of quality and its relationship to cost and schedule is understood by project management participants. Numerous inspections and monitoring systems are in place to assure quality of work performed by both company and contractor forces.

11. A process and a process owner for the handling of contingency funds has been identified.

The Company's policy in Electric Operations is to apply a 10 percent contingency to the appropriations estimates. These estimates are developed in region engineering, who is the "owner" of the contingency funds. Unlike a standard lump-sum contract construction project, the region work is done by company construction forces on hourly rates or contractor forces on unit rates. The contingency funds are controlled by the sum total of the eTRACS layouts released against the project.

12. Project management principles that define requirements for contractor project management programs on "turn-key" projects are in force.

The requirements for the management of contractors performing construction projects or service projects are covered in detail in the Contract Administration Manual. Liberty feels that this procedure does a good job of defining these requirements according to accepted project management practices.

13. The role and responsibility of the project manager in not clearly defined and understood throughout the organization. (Recommendation 2)

There are no written procedures in place for defining the project manager role in Electric Operations.

14. There are no consistent expectations for project managers in place. (Recommendation 2)

There are no written procedures in place for defining the project manager expectations in Electric Operations.

15. Project management requirements for project participants are not generally consistent across all projects. (Recommendation 2)

There are no written project management procedures or requirements in place in Electric Operations. However, the collaborative process used in each region is generally consistent.

16. There is linkage between project management and the budgeting systems, but the linkage is not very clear. (Recommendation 1)

The budget estimates are an order of magnitude estimate. The appropriation and construction estimates are more detailed. There is often a large difference between the two. As a result costs are generally managed on a high level, often at the regional level. This leads to a loss of level of visibility at the project level for the budget results.

17. The relative priority of projects and programs is properly defined in the planning and budgeting process.

Distribution Engineering in Engineering & Planning, working with the Regional Electric Operations organizations, reviews proposed programs/projects to determine prioritization for funding projects in the Electric Distribution (ED-1) capital budget, and ensures the capital projects and programs are aligned with the overall corporate priorities and corporate budget. Once these priorities have been approved the Project Manager does not have to compete for the resources.

18. There is no written provisions for the collective management of small projects.
(Recommendation 2)

With the exception of the large projects such as an area substation load transfer of a large new business customer, the bulk of the construction work in Electric Operations is composed of many small projects. For the many small projects (or pieces of work) in distribution at an individual level, there is no need or value added by a formal project management structure. The layout or work order originator in engineering serves as the project manager and the applicable construction crew foreman serves as the construction manager. Each of these individual projects could vary widely in their cost, length, timing or value added.

It is in the aggregate management of all of these projects in an overall program where value is added. It is the program management that adds overall value by controlling planning, direction, implementation guidelines, scope control, cost management plans and control. This overall program management needs to be a more formal process with written guidelines and expectations.

19. The project management program applies to all organizations participating in a project.

The regional contractor workforce works through the Construction group in Central Operations. They work under the direct control of the Construction group work planners, and work within the process of the user group. The contractors are aligned as a full participant in the project management process in Electric Operations.

5. Recommendations

1. Implement a work management system in Electric Operations. *(Conclusion 1, 4, 5, 16)*

CECONY maintains a suite of individual applications that support the core work management processes within Electric Operations. New applications and enhancements to the existing systems have introduced new technologies, enhanced functionality and improved integration between the applications that comprise the work management suite. While these systems remain viable and technically supportable, they do not provide the level of visibility that would be desirable to better facilitate the management of all aspects of work.

There is no current system in place that integrates scope, cost and schedules for the work packages. This makes project control and oversight difficult. Due to this lack, considerable effort is being expended to organize and direct the normal construction work of the distribution system. In addition to the difficulty of managing this work, many opportunities for cost control are not readily apparent and are opportunities missed.

An integrated Work Management System (WMS) is a standard tool in the industry for distribution work management. The need for a WMS is not just an IT need. It is first and foremost a process need in Electric Operations. The current work processes are built around the lack of a WMS system. Much effort is expended for daily monitoring and coordination of the basic work. The implementation of a WMS tool should change many of the work management processes and practices in place. A WMS system will make daily work monitoring and coordinating almost automatic and allow for more sophisticated project management processes and control.

The O&M programs would also benefit from a work management system. Currently most of these programs are tracked on spreadsheets using data extracted from various systems. The inclusion of these items in a work management system would allow for comprehensive crew resource management.

A modern work management system that is integrated more with material and cost pricing processes would also enable a more accurate estimating system. Currently the budget estimates are order of magnitude only. The following distribution budget appropriation estimate is more detailed and often does not match. This leads to a loss of visibility of the budget at the project level.

Liberty has had several discussions with CECONY personnel on this recommendation. The Company had previously conceptualized the need for a new system so there was a basis for discussion already in place. As an outgrowth of our discussions, the Company has put together an integrated team to conduct a “Phase 0 assessment,” which will include calculating the cost/benefits of a new work management system.

Liberty has urged the new team to focus on process development; this project should be viewed as a process effort and not an IT project. This is a critical distinction, and one that the implementation management should make a high priority.

We further emphasize that the integration of our cost management recommendations (in Chapter XII) should advance ahead of full process development. Those cost management concepts will form an important part of the work management process. They will play a large role in defining managers’ “needs” that are to be met by the new work management system. It would be foolish to proceed too far with system definition when the user-managers still do not understand their needs.

With respect to cost benefit, we emphasize that the current mode of operations contains hidden costs that are very sizable. The multiple, non-communicative systems create a high level of inefficiency that forces countless workarounds and patches. The Phase 0 team should pay particular attention to these hidden costs in evaluating cost benefit.

In summary, Liberty believes that the Company embraces the need for a new system and is aggressively moving ahead, in advance of this report, to make it a reality.

2. Design and implement written project and program management procedures and expectations, including definitions of roles, responsibilities and expectations, cost control plans, and scope control procedures. (Conclusion 2, 7, 9, 13, 14, 15, 18)

A written project management process and procedure should be in place to provide structure. These procedures should also provide expectations for both project and program management. These procedures should define roles for key individuals such as the project manager and program manager.

With the exception of area substation load transfers and some large new business projects, the individual projects in Electric Operations tend to be small and spread out over a large area and number of feeders. Many of these projects are contained under programs. As a result it is critical to have written program management procedures and expectations in place to control the overall programs. This would provide the basis for a cost control plan. It would also provide the basis for a scope control plan to identify deviations and take actions to mitigate their effects.

The cost of developing and implementing these management procedures would generally be done by the existing Electric Operations personnel as a part of their normal work functions. Benefits would accrue from better scope management and control of the programs. The system reinforcement programs have been a total of \$60M over budget for the past three years.

3. Implement a corporate total holistic approach to cost management. (Conclusion 6)

A total holistic approach to cost management would elevate the company's organization and effectiveness. This cost management concept and more detailed recommendations are covered in Chapter XII; *Work Management*.

XIV. Project and Program Management – Gas

CECONY gas construction work has increased significantly. The Company employs project management approaches in its gas transmission work, but there are numerous opportunities for improvement in the program, especially in scope control and cost management. The Company makes little use of project management principles and techniques in gas distribution projects. There is no structured program and there are no dedicated project managers. CECONY has a major improvement opportunity in this area of its gas business.

Our evaluation of gas project management also revealed a general cultural barrier to change, as Liberty observed in other Company organizations. Managers generally consider CECONY's challenges to be unique; that belief has validity in a number of respects. A companion belief, that the experience of others is therefore not illuminating, keeps CECONY from making improvements.

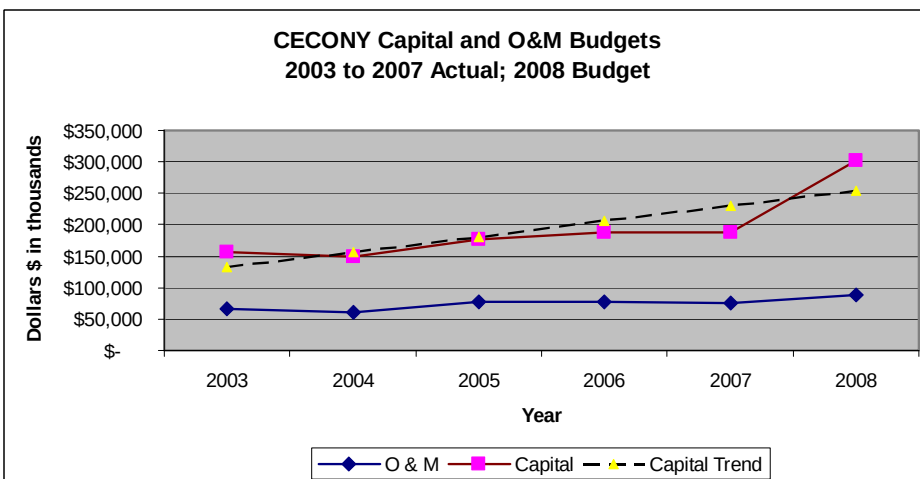
A. Background

The electric business unit (EBU) is the largest of the three comprising approximately 75-80 percent of the revenue stream of CECONY. The gas business unit (GBU) is approximately 10-15 percent and the steam business unit (SBU) is the remainder. The CECONY capital budget for all three business units has increased considerably over the last several years. The 2008 capital budget for all the businesses exceeded \$2.6 billion for 2008. The GBU's \$300 million share of the total capital (12 percent of the total) is in keeping with its size, as measured by revenue. This section of the report will focus on gas project and program management. Other chapters focus on gas supply (Chapter XVII) and gas planning (Chapter IX). These three gas activities, supply, planning and project/program management (execution) are inter-related and dependent on each other for a successful capital spending plan and a reliable system to serve customers.

Over the last several years CECONY has been consistently increasing both the GBU O&M (Operations and Maintenance) and capital budgets. The table and graph show the 5-year trend of increased spending.

Additionally, the 2007 gas rate case approved an increase in the gas capital budget through 2010 in order to replace significant amounts of leak prone (bare steel without cathodic

5-Year Gas Spending History			
Year	O&M	Capital	
2003	\$66,028	\$155,933	Actual
2004	61,330	149,839	Actual
2005	77,682	177,681	Actual
2006	77,157	188,278	Actual
2007	76,301	187,746	Actual
2008	88,352	302,254	Budget
(\$000)			



protection) mains and small diameter cast iron mains prone to breaks and cracks. Thus, the large 61 percent, increase in gas capital spending in 2008 over 2007 will continue at the current rate for at least two more years and possibly longer.

The criteria by which Liberty evaluated project and program management - gas included the following:

- Process structure and phases

A project management program should be in place that addresses all of the elements of project management and is targeted at appropriate cross-functional projects.

A team of project/program managers should exist that have experience in all elements of project management and have suitable credibility within the necessary work processes.

Large projects/programs should be provided with dedicated support resources, including planning, scheduling and cost engineering skills.

Project management principles should also be applied to significant O&M efforts requiring cross-functional participation.

Formal approval and kick-off of projects/programs should not be permitted in the absence of reasonably firm scope definition and a cost estimate whose quality is consistent with the current design status.

- PM knowledge areas and attributes

The philosophies, principles and methods of cost management that are described in further detail under “Work Management” should be applied in the project environment. This includes the holistic approach, appropriate systems, measures, analysis, reports and corrective action requirements.

Major components of the work should have their own tailored “cost management plan” that describes the baseline cost, who is accountable and how costs will be managed. Such plans should include the specific actions required of the cost manager and the supporting cost engineer.

Large projects should contain “exit ramps” early in the job to permit management reconsideration if costs begin to escalate.

A program of scope control should be in place that identifies scope deviations early, requires analysis of such deviations and the mandatory specification of alternates to mitigate the effects of the deviation.

The role of quality and its relationship to cost and schedule achievement should be clearly defined and understood by all project participants.

A process for the handling of contingencies should be defined and the “owner” of budgeted contingency funds for purposes of funding approvals should be identified.

Project management principles that define requirements for contractor project management programs on “turn-key” projects should be in force.

- Organizational culture and capabilities

The role and responsibility of the project manager should be clearly defined and understood throughout the organization.

Expectations for project managers should be consistent with the authority and resources given the project manager.

Project management requirements for project participants should be generally consistent across all projects.

There should be a clear linkage between project management and the budgeting systems, characterized by input from and feedback to those systems.

The relative priority of projects and programs should be defined in the planning and budgeting process and, once projects have been approved, assigned and scheduled, those priorities should be moot (i.e., the project manager should not have to compete for resources).

- PM applied to program management

The construction program should have provisions for the collective management of small projects, as opposed to the standard project management approach.

The project management program should apply to all organizations participating in a project, whether CECONY or contractors.

B. Findings

1. GBU Business Plans and Vision

Each business unit addresses budgeting and business planning differently and some business units have more than one business plan. The gas business plan uses two separate plans. The first, addressing gas transmission, addresses the system entry points (gate stations) and the movement of high pressure gas throughout the CECONY service territory to various distribution centers or other system locations. This plan also addresses related facilities; *e.g.*, regulator stations, remote operated valves, and tunnels. The second plan addresses the distribution system, which takes the gas after the pressure has been reduced, and moves it street by street to individual customers. The transmission system may also have some individual customers, but they typically consist of very large users, such as power stations or industrial complexes. Both of these plans provide a vision of what CECONY expects the gas system to consist of in 2025, and, more significantly, what changes (*e.g.*, infrastructure investment) need to take place to achieve this configuration.

The vision for the transmission system as described in the Transmission System Master Plan includes replacement of all of the early (or vintage) pipelines with larger mains using materials that provide additional safeguards. A significant driver for this section of the plan is to increase pipeline capacity within the internal CECONY system to survive the temporary loss of a gate station during design day conditions (0 deg F) without firm gas customers losing their supply. By using higher grade steel (now available but not available when these early mains were constructed in the 1950s) CECONY will reduce the associated risk (probability x consequence) of the transmission system and change the mains designation from transmission to distribution¹. It is accepted that distribution pipeline systems, which operate at less than 20% of the main materials specified minimal yield strength, will leak rather than rupture, greatly reducing the probability as well as the consequence of an incident. In addition, mains with hoop stress of less than 20 percent are not subject to periodic transmission pipeline integrity inspections. Once the

¹ The definition of gas transmission per US DOT CFR §192.3 is: 1) a pipeline with a hoop stress greater than 20 percent, 2) a pipeline that transports gas from a storage field, gathering line, etc. to a distribution center, a storage field, a large volume customer that is not downstream of a distribution center, or 3) transports gas within a storage field. New York has some additional testing and maintenance requirements for pipelines that operate at 125 psi or higher that mandate they be treated as transmission pipelines regardless of the hoop stress.

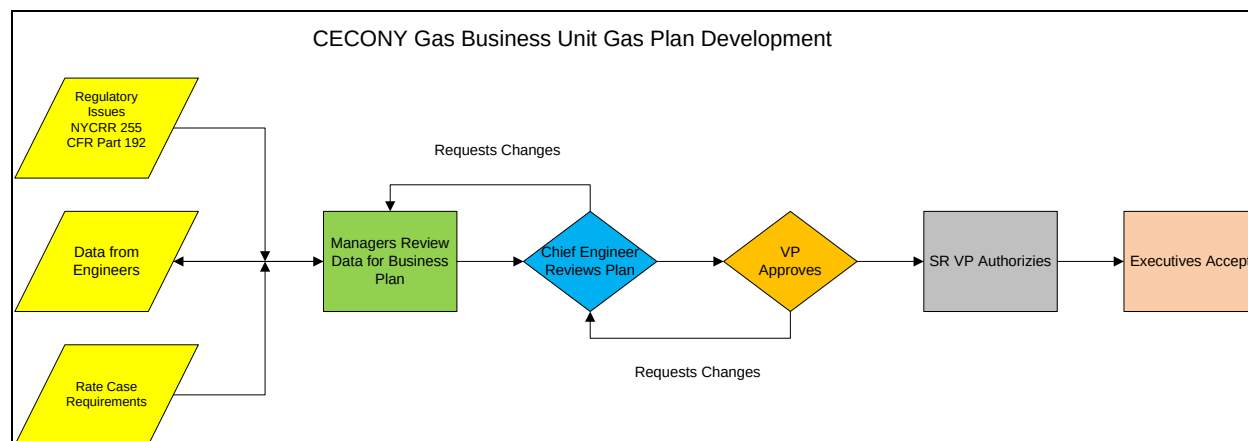
new mains of larger capacity are installed, the older existing mains will be converted to lower pressure to reinforce the distribution system. It is difficult to determine the cost benefit of these moves: the significant cost of looping the transmission system with new larger and stronger mains needs to be balanced against the greater supply reliability it provides along with the potentially significant avoided cost of collateral damage and relighting of customers if an incident were to occur.

The distribution system vision includes improving safety and reliability, and reducing leakage on the entire system. The cost of replacing leak-prone mains and services is significant and the mileage in the CECONY system is extensive. This will be a long term endeavor and may exceed the 2025 vision period. Total fulfillment of this vision will require CECONY to:

- Remove the leak-prone bare steel mains and services
- Replace small diameter cast iron
- Provide dual feeds to areas in place of radial feeds (two ways to provide gas vs. a single feed)
- Use non-corroding materials
- Undertake other safety and reliability initiatives as required.

2. Gas Business Unit Planning Process

These business plans and visions for 2025 form the basis for the 2008 capital plan. The next chart shows the flow of activities involved in preparing gas business plans and the inputs used. Chapter III: *Corporate Planning* discusses all CECONY's plans in more detail.



The timing of the business plan coincides with the executive planning process, which allows the GBU plans to form part of the annual corporate budgeting process. Input starts in the spring with preparation of the long-term, the 5-year, and the yearly GBU plans. The annual and 5-year plans are checked against the 2025 vision by the chief engineers, who must approve them prior to their presentation to the vice presidents of Gas Engineering and Gas Operations. VP approval is followed by successive reviews by the Senior Vice President Gas, and then top CECONY executive management.

3. 2008 Gas Capital Budget

The 2008 Gas Capital Budget, approved following consideration of the 2025 GBU vision and the 1- and 5- year spending and budget plans, approved a 61 percent increase over the 2007 plan. The majority of the increase was a result of the 2007 gas rate case (which covers the gas season from 2008 through 2010). Significant increases in the amount of main and service replacements on bare steel and small diameter cast iron drove much of the increase allowed as part of that rate case. The accompanying table summarizes the budget's main components.

Adding the service replacements, main replacements, system reinforcement, and supply mains yields approximately \$168.5 million (56 percent of the \$300 million). Thus, distribution mains and services comprise the major component of the capital plan. This is where significant increases in spending occurred between 2007 and 2008.

Initial 2008 Gas Capital Budget Plan (\$x1,000)	
Public Improvement	\$32,000
Supply Mains	31,566
Transmission System	17,254
Metering	12,550
LNG	10,380
IT Projects	7,467
Manhole Issues and Regulators/Valves	4,320
Main Replacement and System Reinforcement	109,824
Cathodic Protection	\$475
Service Replacements	26,550
Tunnels	2,216
New Business	41,000
Warehouse	3,652
Total	\$299,254

4. Capital Project Case Study

Liberty's work plan called for examining at least one natural gas program/project as a case study of CECONY project management. Liberty's review of the 2008 Gas Capital Plan identified three. One, GOSS (SCADA), is almost complete; another, the LNG upgrade has not started; a third, the main and service replacement program is just completing the first of a three-year program to replace 120 miles of mains throughout the CECONY territory.

a. GOSS

The GOSS upgrade project is running within its \$3 million authorization and appropriation and has incorporated some minor scope changes required to incorporate all anticipated regulatory requirements of the new federal control room rules. CECONY is essentially managing this SCADA as a turnkey job. Its SCADA system vendor is performing all of the programming, integration, equipment purchasing, and validation. This vendor has installed the equipment at its offices in Canada, and has linked it to CECONY to allow operation by CECONY personnel for training and evaluation purposes. In the spring of 2009, the equipment will be relocated to Van Nest; in the fall control will be moved from the old system to the new system. Between April to the fall of 2009, CECONY personnel will be checking each of the data points (soon to be required by code) that feed the system. This point-to-point testing and validation is being handled entirely by CECONY personnel (*i.e.*, not part of the initial project). Any cost overruns from these activities will not be captured by the project. The project manager and the control manager are one in the same; therefore, there is no real dedicated project manager.

b. LNG

The CECONY LNG Plant has been in continuous service for approximately 35 years. The State does not allow for any additional land based LNG facilities because of a welding incident that happened more than 2 decades ago in two Brooklyn Union LNG storage tanks then being built on Staten Island. The State also prohibits the trucking of LNG on public roads. If an LNG Plant were to cease operation, it could not be replaced. CECONY is therefore looking to replace the current plant, while still operating the old plant. The project has been broken into several sub-projects: vaporization, liquefaction, motor control center (and back feed electric), fire suppression system, and tail gas regeneration. The vaporization project is being handled entirely by CECONY, because it consists of purchasing five new identical vaporizers and installing them. The major technical piece of the project is the Liquefaction area, which has experienced the most problems.

Initially CECONY was looking to have a consultant prepare bid packages, and conduct turnkey engineering, purchasing, construction, and startup processes. The initial consultant became ill, requiring use of another. Then the major liquefaction vendors declined to bid on a turnkey basis, because of problems they had encountered in their last LNG plant construction project in the NY City area (National Grid's Greenpoint, Brooklyn Plant). Thus, the project is now behind schedule (and possibly over estimate). The current approach is to use an engineering contractor and a design contractor. CECONY will perform procurement, and then hire a construction company to build the plant. Essentially the project is at the initial stage; the consultant is preparing bid packages for the engineering and design activities. At the time of Liberty's audit field work, there was no project manager for this project; the LNG Plant Manager was both running the plant and handling all of the project management functions. Recently, CECONY named a project manager to assist the Plant Manager.

c. Main Replacements

The third project or program Liberty evaluated comprised a main replacement program consisting of three parts: replacement of leak prone bare steel, replacement of small diameter (prone to crack or break) cast iron, and replacement of the leak prone services associated with these mains. CECONY planned to replace approximately 40 miles of main in 2008, with a nearly even split between bare steel and cast iron. This is the first year of a 3-year, rate-case-mandated program. This program specifies the replacement of 120 miles over the three years and not less than 30 miles in any given year. Bare steel mains were largely installed prior to the late 1960s; *i.e.*, preceding the requirement that all steel mains (both distribution and transmission) be coated and have cathodic protection to prevent corrosion and leakage. Cast iron mains are typically even older. Utilities installed them in great numbers until the 1950s, at which time steel replaced them as the metal of choice. Plastic in turn succeeded steel for distribution mains in the 1970s, and remains the material of choice today for system pressures less than 125 psi. Plastic is not prone to corrosion but suffers other problems, such as susceptibility to outside force damage, cracking (some 1970s vintage plastics), and pulling apart of some mechanically fastened joints (via a stab or push joint). CECONY did not purchase the 1970s grade of plastic that had the most problems with cracking.

As of the end of 2007, CECONY had 1,293 miles of bare steel and 1,386 miles of cast iron within the four operating areas (Manhattan, the Bronx, Westchester and Queens), with the bulk of these materials in Queens and Westchester. These two materials, bare steel and small diameter cast iron, make up the bulk of the CECONY material-defect sources (leaks and other gas leaks such as breakage and cracking) on the distribution system, and thus present the highest risk to public safety. Selectively replacing the most leak or breakage prone segments will therefore reduce overall risk to public safety.

Some of these materials have been in service for over 100 years; thus, their economic life has long been exceeded as is occurring with their physical life. Replacing these mains not only reduces the risk of incidents to the public; it also avoids future costs from uncontrolled segment failures requiring emergency replacement or leak repairs. The critical management challenge is to determine an optimum economic balance between the capital cost of replacement and the O&M cost of maintenance (see Chapter IX, *Gas Planning* for more details). Ideally, but of course unrealistically, the main should be replaced the day before it has its first leak. CECONY has instituted a model developed by Advantica of Great Britain. The model uses a 5-year history of leaks to identify current locations with characteristics similar those to where leaks have occurred frequently in the past. Starting in 2007 CECONY populated the model with some of its data, and was able to generate a main replacement candidate list for the 2008 program. During 2008 CECONY added additional capability to the model by adding some risk factors that would help to assess both the likelihood and consequences of leaks. Some of the new factors included structures with basements, wall-to-wall paving, multifamily structures, buildings of public assembly (BOPA)¹, and proximity to BOPAs. CECONY intends to begin using risk and 5-year leak history to update its lists scheduled for replacement in 2009.

This main replacement program was part of the 2007 gas rate case, and may be continued in future rate cases. Because this project seems to have all of the elements required by Liberty's evaluative criteria and it was one of the largest expenditures of the capital budget, it was selected to be the test case for the specific issues associated with the Liberty work plan. The program comprises the replacement of at least 30 miles of some combination of bare steel and small diameter cast iron in the four CECONY operating areas. For 2008, CECONY planned to replace at least 40 miles with a fairly even split between bare steel and cast iron. Each of the operating areas would handle the replacement differently. Below is a chart that was prepared based on conversations with various members of the project team (Gas Engineering, Construction Management, and Gas Operations Construction). It describes the use of resources in the regions.

¹ Buildings of Public Assembly (BOPA) are religious organization buildings, hospitals, schools, nursing homes, day care facilities, prisons, etc.

Contractor vs. Employee Construction for Main Replacement

Method - County	Manhattan	The Bronx	Queens	Westchester
Gas Construction	X	X		
Gas Construction and assist contractor		X	40 percent	25 percent
Turnkey contractor and GC oversight		X	X	
Turnkey contractor and Construction Management	X		X	X

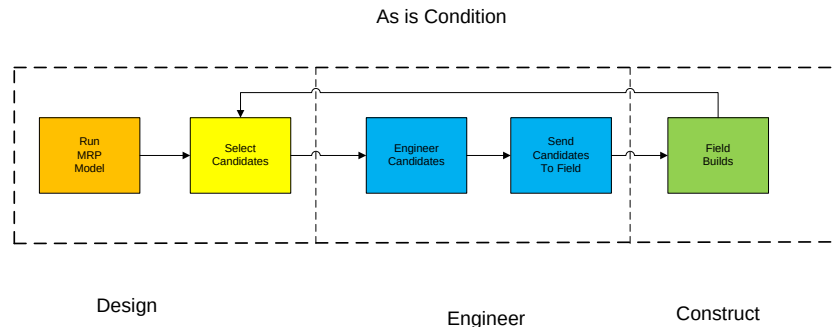
CECONY has multiyear construction contracts with different contractors in each area. The areas also use per diem contractors, assist and area contractors, and turn-key contractors. The areas that will have most of the construction activity (Queens and Westchester), will use CECONY's Construction Management service organization to assist in managing the contractors. Below is a listing of the current gas contractors, their type of contract and which areas they provide services.

Current CECONY Contractors by Area and Type

Area	Contractor	Contract Type	Area	Current Contract Length	Service With CECONY
Queens	Felix Associates	Keyhole	All	24 mo.	20+ yrs
	Hawkeye	Turnkey	All	18 mo.	20+ yrs
	ECI	Per Diem	All	36 mo.	20+ yrs
	Safeway	Area	All	36 mo.	20+ yrs
Bronx	Hallen Construction	Turnkey	All	36 mo.	20+ yrs
	Felix Associates	Keyhole	All	24 mo.	20+ yrs
	Petmar Builders	Per Diem	All	36 mo.	20+ yrs
	Persico	Area	All	36 mo.	20+ yrs
Manhattan	Hallen Construction	Keyhole	All	24 mo.	20+ yrs
	Hallen Construction	Coring	All	24 mo.	20+ yrs
	Safeway	Per Diem	All	36 mo.	20+ yrs
	Felix Associates	Turnkey	All	36 mo.	20+ yrs
	Felix Associates	Area	All	46 mo.	20+ yrs
	Roadway	Area	All	18 mo.	20+ yrs
Westchester	Hallen Construction	Keyhole	All	36 mo.	20+ yrs
	Petmar Builders	Per Diem	All	36 mo.	20+ yrs
	Felix Associates	Turnkey	All	36 mo.	20+ yrs
	Persico	Turnkey	All	36 mo.	20+ yrs
	Bibeau	Area	Northern	36 mo.	20+ yrs
	Persico	Area	Western	36 mo.	20+ yrs
	Felix Associates	Area	Eastern	36 mo.	20+ yrs

The main replacement program/project is engineered, managed and controlled in the Distribution Engineering area of Gas Engineering. Gas Operations provides field and some logistical support.

Distribution Engineering does not have a project management function (there is a project management group within the Transmission Engineering area). In place of this function, the Chief Distribution Gas Engineer and the Manager of Distribution Planning and System Reliability serve as de facto project managers. Not only are they responsible for engineering decisions, but they report on the financial and timing issues. This is being done while the next year's plan and candidate replacements must also be selected via updating the MRP model and integrating interference jobs, government paving plans, reinforcement from the previous winter load and other integrated processes. Below is a simplified flow chart on how these projects/programs are being managed.



The entire project is being handled by the distribution engineering section; there is no separate project management function. This lack of a project management function, while not critical to the success of the program, may be causing some inefficiency to occur since there are no dedicated individuals to follow the progress of this program. The distribution planning organization manpower was increased for this project, but no individuals with project management responsibility were added at that time.

The engineering and initial planning of the program is strong; CECONY is using a new model developed to determine the highest risk segments that need to be replaced. Since the model was piloted and validated in 2007, CECONY has improved it by populating the database with additional risk factors, such as percentage of paving, the location of public buildings, areas that have higher consequences (*e.g.*, schools and hospitals), and areas that have service penetrations through the foundation. For the 2009 replacement candidates, these additional risk factors will be employed. Where the inefficiencies may be occurring is after the design phase and prior to the construction phase, because this is a secondary responsibility for the design engineers. There is no one except the section manager and the chief distribution engineer to coordinate this phase. Additionally, feedback from the installation phase goes to these two individuals; there is a risk that their burdens will become too great, especially if there are many issues going on within the distribution system. There also may be timing issues due to the overlap of the installation phase for the current year and the planning phase for the future year. This factor will also add to workload and may cause attention to installation issues to suffer. For these reasons, Liberty determined that some additional efficiencies may be available on this project.

5. Process Structure and Phases

The following evaluation criteria were used in analyzing the Process Structure and Phases sub-task:

- A project management program should be in place that addresses all of the elements of project management and is targeted at appropriate cross-functional projects.
- A team of project/program managers should exist that have experience in all elements of project management and have suitable credibility within the necessary work processes.
- Large projects/programs should be provided with dedicated support resources including planning, scheduling and cost engineering skills.
- Project management principles should also be applied to significant O&M efforts requiring cross-functional participation.
- Formal approval and kick-off of projects should not be permitted in the absence of reasonable firm scope definition and a cost estimate whose quality is consistent with the current design status.

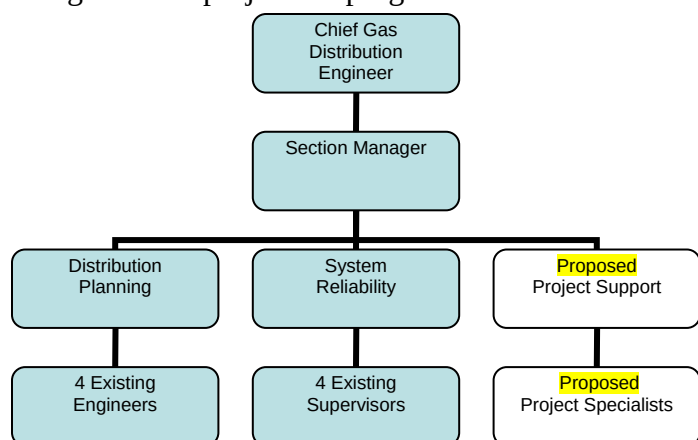
As stated earlier, the Gas Engineering function at CECONY is divided between transmission (those pipelines carrying high pressure gas to distribution points or large customers) and distribution (the lower pressure mains in each street supplying individual customers and residential customers). The transmission section has a dedicated project/program management group that supports the construction program of transmission facilities. The distribution section, has no such group exists; therefore, necessary project management functions are carried out by individuals with other responsibilities.

The distribution and transmission sections also assist the technical services section in providing engineering assistance to the gas O & M program. The program is well established and consists of thousands of small jobs that do not lend themselves to project management techniques unless they can be aggregated into one large program. In a few situations this has occurred, such as the capital and O & M regulator vault rehabilitation program, but in most cases this has not been the situation.

With the incorporation of the main replacement program using a specialized model to select mains for replacement and a significant increase in the amount of main being replaced, CECONY has increased the staff of the planning and design groups but did not add any project management function. In 2008, over half of the capital budget is in the distribution section.

Each capital project/program has a scope and approval document. This document is part of the business plan and specifies the scope and range of the project or program. The document is usually less than one page and in many cases less than a half a page. What is missing is any discussion on some of the risks of the project and there is no discussion of alternatives or other methods of accomplishing the task.

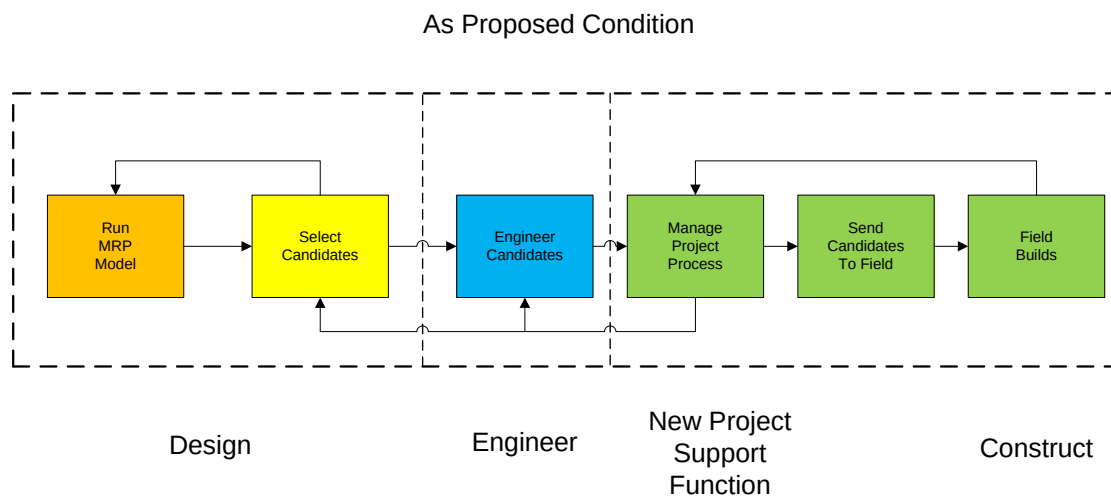
CECONY has proposed some changes to the administration of the main replacement project entitled "Project and Program Management rev4." This proposal is to add additional project type



resources to the gas planning organization per the follow organization chart.

Although the above organization chart shows the individuals would be project support and specialists, in essence this is a project management group which should have sufficient resources to improve and enhance the main replacement project and find additional savings to justify the addition of personnel. A more standardized way of showing this new group as part of the process is shown below.

Figure XIV-5 - Process Flow for Main Replacement Project – Proposed

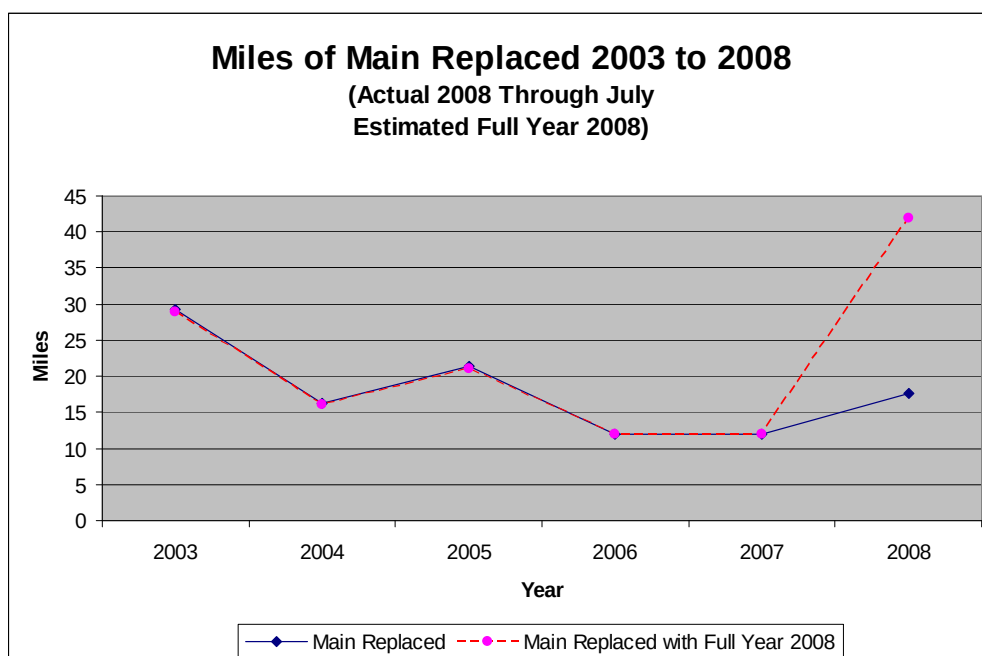


6. PM Knowledge Areas and Attributes

The following evaluation criteria were considered under the PM Knowledge Areas and Attributes sub-task:

- The philosophies, principles and methods of cost management that are described in further detail under “Work Management” should be applied in the project environment. This includes the holistic approach, appropriate systems, measures, analysis, reports and corrective action requirements.
- Major components of the work should have their own tailored “cost management plan” that describes the baseline cost, who is accountable and how costs will be managed. Such plans should include the specifications required of the cost manager and the supporting cost engineer.
- Large projects should contain “exit ramps” early in the job to permit management reconsideration if costs begin to escalate.
- A program of scope control should be in place that identifies scope deviations early, requires analysis of such deviations and the mandatory specification of alternates to mitigate the effects of the deviation.
- The role of quality and its relationship to cost and schedule achievement should be clearly defined and understood by all project participants.
- A process for the handling of contingencies should be defined and the “owner” of budgeted contingency funds for purposes of funding approvals should be identified.
- Project management principles that define requirements for contractor project management programs on “turn-key” projects should be in force.

Where Gas Engineering is working on large discrete projects in the transmission section, there are sufficient resources to dedicate a project manager to follow each job. In some situations, jobs that have some commonality are tied together for one project manager to administer and run. In the distribution section, which in the past had typically smaller and isolated projects, this was not the situation since there is no dedicated project group. Starting in 2008, the main replacement program was significantly increased and approximately 400 main jobs are being scheduled for each year in 2008 through 2010. These jobs are spread all over the service territory but the bulk of them will be in Queens and Westchester with only a few jobs in Manhattan and the Bronx. This is a large increase in work load for the distribution planning group. Below is a graph with the amount of main replaced from 2003 through July 2008 and an estimate for the full year of 2008.



The requirements for the main replacement project are to replace 120 miles of bare steel or small diameter cast iron over a three-year period of 2008 to 2010 with not less than 30 miles being replaced in any given year. At the proposed 42 miles for 2008, CECONY will meet the commitment.

CECONY uses a combination of internal and external resources to construct the replacement mains. They use area or assist contractors, internal forces, per diem contractors, and turn key contractors. Supervision of the contractors is either by the local area or by construction management, a central support group. In all of the situations where contractors are used, project management principles are utilized via supervision and the multiyear contract.

Where a scope change is necessary, such as when there is an adjacent corroding main, the project manager; i.e., the gas planning section manager, is contacted before any additional work is performed. Because of the experience and long term association of individuals within gas,

answers are quickly given and work can proceed without delay. Typically, gas engineering will agree with expanding the main replacement without a site visit. Per field construction personnel, the support they receive is excellent. Where these additions can impact the program budget, the lowest priority job will be deferred to the following year providing there are no over riding circumstances, such as a paving job, an interference job or a reinforcement job that needs to be done.

7. Organizational Culture and Capabilities

The following evaluation criteria were applied in the Organizational Culture and Capabilities sub-task:

- The role and responsibility of the project manager should be clearly defined and understood throughout the organization.
- Expectations for project managers should be consistent with the authority and resources given the project manager.
- Project management requirements for project participants should be generally consistent across all projects.
- There should be a clear linkage between project management and the budgeting systems, characterized by input from and feedback to those systems.
- The relative priority of projects and programs should be defined in the planning and budgeting process and, once projects have been approved, assigned and scheduled, those priorities should be moot (i.e., the project manager should not have to compete for resources).

Where Gas Engineering has transmission project managers, their roles, responsibilities, authority and range of control are consistent across all projects and understood throughout the organization. To some degree, the designated 'project managers' in distribution (i.e. section managers or the chief distribution engineer) have similar roles and act with similar authority.

All of the capital budget projects within gas are designed via the planning process which is linked to the two business plans, transmission and distribution. These plans in turn are linked with NYS PSC mandated programs or projects. Additionally, these are also linked to rate cases (see Figure XIV-2, above). Thus, the planning, engineering and execution of capital projects and programs follows the business plan which is a road map for the system as it will be in 2025. The priorities of the plan are determined by customer needs, regulatory requirements, public safety issues and corporate policies. Very little of the gas capital plan is optional (classified as priority #3) while most is priority #0 and #1, regulatory or safety required.

The only time that projects or programs deviate from the above scenario occurs when there is a reaction to an unforeseen or unanticipated event such as a major failure, a serious accident or a major regulatory finding (that highlights an out of compliance issue). In these situations a major program is initiated out of sequence to rectify the situation. Currently CECONY is waterproofing regulator vaults under such a multiyear program. These reactionary programs do not have good cost control because CECONY must accelerate the compliance issues and does not have the luxury of performing planning to minimize the cost of the program.

The corporate culture of CECONY is significantly different from other utilities because CECONY management believes they operate in the most demanding environment in the world. This belief translates into an attitude that they, CECONY, know better than any other utility and thus can not learn anything from sister utilities or utilities operating in other urban and suburban territories. This also translates into the belief that cost issues are unique to NYC and when there are cost overruns, that is the price of doing business in NY and not a failure of management to contain costs and evaluate alternatives. This culture has been noticed by other utilities that interact with CECONY and with consultants or vendors who have business with CECONY. This culture is top down and is reflected in many of the decisions that are made and in how projects and programs are run.

8. PM Applied to Program Management

The following evaluation criteria were applied to PM applied to Program Management sub-task:

- The construction program should have provisions for the collective management of small projects, as opposed to the standard project management approach.
- The project management program should apply to all organizations participating in a project, whether CECONY or contractors.

Most of the projects or programs in the distribution section of Gas Engineering are small jobs that are aggregated into larger entities under 'GD' codes. The main replacement program consists of approximately 400 main jobs under GD-4 and GD-11. This is also true for services which are aggregated under GD-3. Thus these small jobs now represent approximately 50 percent or more of the gas capital budget. Reinforcement, new customer work and interference work can also be similarly handled.

The various contractors that CECONY uses are either managed by Gas Operations or by Construction Management. In either situation, these two groups utilize project management techniques in the construction stage and thus provide sufficient guidance to the contractors for decision making. Where there are major technical or large cost issues, Gas Engineering is contacted to make the appropriate decision. Of course, many of these decisions are in reaction to events and not proactive.

C. Conclusions

1. The Chief Distribution Engineer needs a project support/specialist to assist in coordinating and executing the main replacement, reinforcement, and other distribution engineering capital projects or programs. (Recommendation 1)

Between 2007 and 2008 the Gas Capital Plan has increased by 61% with a majority of that increase in the gas distribution section. The gas distribution section has added engineering and planning personnel but has not added any project management function to assist in optimizing these projects. The as-is condition has the planning section manager and the chief distribution engineer acting as project managers while they are also planning the future years work. This dual role may lead to some cost savings or optimization savings not being identified because of a lack of resources. Additionally, the current project management team is in reactive mode and acts when there are issues but does not have the time to become proactive.

- 2. The project scope documents for gas capital projects do not give sufficient details that address the risks and rewards of the project or provide alternatives that were evaluated and not chosen.** *(Recommendation 2)*

The project scope documents for all gas projects are very brief and just lay out the basics of each project. There is no discussion of some of the risks or the rewards of the project so upper management, per the documents, does not know why these are critical or necessary projects. Additionally, there is no discussion on alternatives and why they were not chosen. The lack of these sections in the project scope document ensures that upper management may not have a true picture of the ramifications of the project nor can effectively evaluate if the proposed method is in the best interest of all the stakeholders (rate payers, shareholders, regulators, and company employees).

- 3. CECONY has an insulated corporate culture that undervalues the potential for learning best practices from others.** *(Recommendation 3)*

We have seen this belief play out time and again in CECONY and must conclude that it is a particularly strong cultural barrier to improvement. Overcoming this barrier, in order to realize the improvements recommended in this report, is discussed in more detail elsewhere.

D. Recommendations

- 1. Staff a project coordination/specialist group under the Chief Distribution Engineer to assist in the execution of distribution capital projects such as the main replacement program.** *(Conclusion 1)*

CECONY has already agreed that the distribution engineering section should have a project group to assist in the execution and the optimization of distribution engineering capital projects and programs. A group of 4 to 6 engineers to serve as project managers would cost around \$600K to \$900K and would pay for themselves if they optimized and saved just 1 percent of the distribution capital budget (1 percent of \$160MM is \$1.6MM).

- 2. Improve and expand the current project scope documentation to add sections on risks and rewards and alternative methods.** *(Conclusion 2)*

The current project scope document is just a statement of the work to be completed with no justification on why or what are some of the advantages and risks of doing or not doing the project. Additionally there is no discussion of alternative solutions and their related risks and benefits. The document should have this additional information so that more intelligent decisions can be made not only on the merit of the project but also on the best alternative to utilize to complete the project.

- 3. Start benchmarking with other urban utilities and utilize what these other utilities are doing better to improve the CECONY program and project management of capital projects.** *(Conclusion 3)*

There are several other U.S. utilities that may have a similar operating environment to CECONY, such as PG&E in San Francisco, National Grid in Boston, Southern California Gas in Los Angeles, etc. CECONY should study how these companies perform their respective program

and project capital work and adopt the best practices that could assist CECONY in reducing costs and improving outcomes.

XV. Project Management - Steam

CECONY's steam-related projects and programs have generally been of shorter duration, of smaller scope and routine in nature. The application of sophisticated project management approaches has therefore not as often been required. Liberty generally found the focus on project management in the steam business to be adequate, but nonetheless believes that the Company can benefit from a more formal and structured approach. Specifically, decisions on when and how to apply project management principles should be made on a formalized set of criteria. Further, Central Operations procedures relating to projects should be more specific in their instructions regarding steam projects. Finally, training in project management skills should empower managers associated with various steam projects.

A. Background

This chapter addresses CECONY's project management processes, specifically its steam-business techniques, controls, procedures, and practices to control of project and program cost, schedule, quality and scope.

Formal *Project Management*¹ consists of five overlapping/interacting Process Groups or Phases and nine Knowledge Areas. The Process Phases overlap and enable project fast-tracking while keeping the process predictable and controlled. *Process phases* are initiating, planning, executing, monitoring and controlling, and closing phases. *Knowledge areas* are integration, scope, time, cost, quality, human resources, communications, risk, and procurement management.

Although the work plan did not specifically define criteria for steam project management, the criteria for electric project management were used as a starting point with the recognition that several are not appropriate to steam and that the level of effort applied to steam was considerably less than electric. The criteria by which Liberty evaluated project management - electric included the following:

- Process structure and phases
 - Is a project management process in place to address the elements of project management targeted at cross-functional projects?
 - Is the program of sufficient detail to provide for consistent and thorough actions?
 - Are project managers experienced in project management elements?
 - Are large capital and large O&M projects requiring cross-functional efforts, provided with dedicated support resources to address planning, scheduling, and cost engineering?
 - Do controls exist regarding project scope, planning, cost, quality of work, reporting, and closeout? Are performance measures identified and results analyzed?
- PM knowledge and implementation
 - Does Steam Operations implement a philosophy of project management?

¹ Project Management Institute defines a formal recognized and accepted approach to successful project management.

- o Do major projects have tailored cost management plans that identify who is accountable and how costs will be managed?
- o Do “exit ramps” exist early in the job that allow reconsideration if costs escalate?
- o Is a method of scope control practiced that adequately evaluates scope creep?
- o Is cost control defined, requiring approval for handling contingencies?
- o Are quality and quantities verified to ensure payments for contract requirements are correct?
- Organization culture and capabilities
 - o Is the role of the project manager understood and the PM process supported?
 - o Are expectations for the project manager realistic considering authority and resources provided?
 - o Is project management applied consistently?
 - o Is there clear linkage between project management and budget systems?
 - o Is the relative priority of projects and programs defined in the planning and budgeting processes, and followed?
- PM applied to program management
 - o Is project management applied to programs as a collective management of small projects?
 - o Is project management applied to both CECONY personnel and contractors?

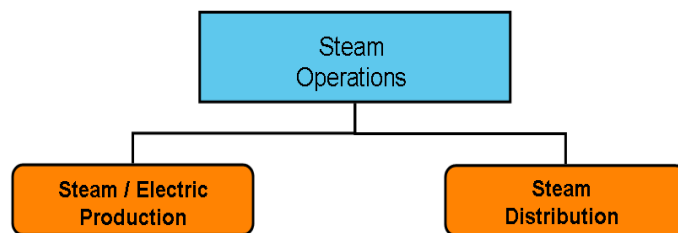
Considering project management principles, Liberty assessed steam’s project management function by addressing:

- How Steam Operations accomplishes its work
- Why it functions that way
- How approach works
- How effective this approach is

Steam Operations has a complement of 735 management and union personnel involved in steam generating and steam distribution operations. Contractor personnel supplement maintenance and construction work for plants and for distribution operations. CECONY indicated that with respect to capital work at the generating stations, project

managers at the individual stations have overall responsibility for managing the capital projects in their facility. For larger projects, the construction portion of the project is managed by the Construction organization with the Station Project Manager working with the Construction Organization coordinating efforts for the Station. With respect to O&M work at the generating stations, maintenance managers at the individual stations have overall responsibility for managing the work. In some cases, the Construction organization and the Station Project Manager's may be asked to manage the work, depending upon the nature of the job. With respect to steam distribution system, Central Construction Management’s Construction Services Group

Steam Operations Organization Chart



manages projects with expenditures in excess of \$50,000. Contract Management within Steam Operations oversees “small ticket” O&M and capital work (from \$20,000 to \$50,000). Central Engineering provides support for steam distribution and generating stations through separate Civil, Electric & Steam Distribution Groups. The Steam Engineering Distribution Group is comprised of engineers and designers that are dedicated to the project needs of the steam distribution system. The needs of the system are program driven. Engineering Service Requests (ESR) identify project needs of the generating stations; engineering evaluates alternatives, defines project scope, develops designs, cost and time estimates, and prioritizes projects based on evaluation of specific attributes; *e.g.*, reliability. Competitive bids determine use of outside contractors. Central Engineering’s Project Engineering group assigns a project engineer to coordinate engineering support from receipt of ESRs through construction.

The Vice President of Steam Operations provides overall direction and strategic planning for steam operations. Four Plant Managers, one General Manager, one Department Manager, two Department Managers, and one Section Manager report directly to the Vice President. These reports and provide information directly concerning each steam generation plant, Customer and Business Services, Environmental Health and Safety (EH&S), Financial Services, and the steam distribution network.

Each Steam Plant Manager provides overall direction and strategic planning for all aspects of the power plant’s operation, maintenance, technical, and environmental health and safety. They oversee the work of the Operations Manager, a Maintenance Manager, a Technical Services Manager, an EH&S manager and a Project Manager. The Project Manager plans and directs all activities associated with major projects that will improve the operations, maintenance, and availability of steam equipment within the steam plant.

To gain an understanding of how CECONY applies Project Management within its Steam Business Unit, Liberty interviewed representatives from Steam Operations, and Central Engineering. The interviewees included the VP of Steam Operations, General Manager of Steam Distribution Operations, Financial Services Manager, Field Operations Planner, Distribution Services Manager, and Chief Construction Inspector. Liberty also conducted field observations of working projects. Steam Operations personnel provided a perspective that included customer needs and constraints, NYC traffic permit constraints and coordination, financial and budget controls, project planning review and approvals, operations and maintenance constraints, and well as steam delivery needs and accomplishments. Engineering provided an understanding of the technical evaluations, project controls, planning, scope definition, cost estimates and appropriations, project scheduling, material procurement, and procedures and standards.

B. Findings

The General Manager for Steam Distribution provides overall direction and strategic planning for the department concerning all aspects of operation, maintenance, and construction of the distribution-piping network, and manages the work of Section Managers. Work on the distribution-piping network requires close coordination among issues involving customer needs, the steam supplied from steam plants, NYC’s multiplicity of subsurface structures, work permit restrictions, and traffic conditions in the streets. Put simply the city’s work environment is

challenging, and often made even more difficult due to escaping steam and asbestos abatement considerations.

1. Budget and Financial Controls

Steam Operations indicated that its budgets are program driven. Plant and distribution level program managers meet monthly with CECONY financial analysts to review person-hours budgeted versus actual for functional categories; *e.g.*, labor associated with plant operations, fixed posts, asbestos related expenditures, environmental related, mandated inspections, steam distribution leak repairs. Many performance measures exist, however, the VP of Steam Operations and senior managers pay particular attention to one key performance indicator (KPI), O&M and capital expenditures. Each month they also review other performance measures with plant managers on operating issues and functional categories. CECONY performs monthly forecasts of year-costs to determine whether corrective actions will be necessary if the budget is being over-run. Two-year O&M and 5-year capital budget needs are reviewed and adjusted monthly with plant and general managers, after reviewing extraordinary expenditures, new projects, and program needs. Training in financial control (cost planning and control) is provided twice a year (two different modules) for central engineering and for steam operations managers.

2. Project Management Procedure

Project Management within steam plants functions in accordance with Central Operations Procedure (COP) 10-0-5, which provides a standard for the development, implementation and management of projects. Each department within Central Operations is expected to “internalize” the five phases of Project Management: Project Initiation, Project Scope and Funding, Engineering Design, Construction, and Project Closeout. The standard defines the role of Project Manager, Discipline Engineer, Project Engineer, and Construction Manager. A project is defined as “Work requiring engineering support that cannot be resolved through field or system engineering and results in a modification to a system, structure or component that typically requires multiple technical disciplines or work groups to complete.” Project managers are responsible for capital budget expenditures. Project managers review progress on projects and associated expenditures At monthly meetings with financial analysts, in order to determine if project budgets are being met.

Steam Distribution Operations indicated that the traditional Project Management Process consisting of all 5-process elements of project management (*i.e.*, Initiating Process, Planning Process, Executing Process, Monitoring and Controlling Process, and Closing Process) does not neatly lend itself to the routine work and activities (less than \$50,000 per project) performed in steam distribution operations. COP 10-0-5, (14 pages; dated June 12, 2008) define Steam Operations five project management steps. This procedure superseded a previous COP dated October 29, 2005. COP 10-0-05 provides direction on how the processes are to be accomplished and includes a detailed flow chart. The major steps follow:

- *Project Initiation*: process step defines or initiates the project via an Engineering Service Request (ESR) or due to leaks, interference projects, regulatory requirements, reliability programs or other defined needs.

- *Project Scope and Funding:* develops site layout, drawings, materials list, project milestones, and calculations and cost estimates. Ensure project receives funding by developing an appropriations document for the capital budget process (line item) and is assigned a schedule/year. A current working estimate (CWE) is initiated and maintained throughout the project.
- *Engineering Design:* defines and refines objectives, and plans the course of action required including permit restrictions, construction concerns and project outage windows. Drawings, specifications are prepared and approved, special materials lead times are identified.
- *Procurement and Construction:* The PM ensures project start, construction and completion are within schedule and cost projections. This includes purchasing, putting the project out for special bid, ensuring construction is in accordance with designs and plans, and meets outage windows.
- *Project Close-out:* The PM conducts any close-out inspections to ensure scope of work is fully accomplished, completes as constructed drawings. Conducts post construction lessons learned. Prepares any cost over-run cost justifications.

For larger projects, (between \$20-50,000 depending on the nature of the work to be accomplished) the General Manager assigns a Project Engineer. For smaller projects, the PM responsibilities may be assigned to a steam engineer or other “qualified” individual.

Steam distribution work routinely performed includes:

- Unplanned work, such as responding to and investigating leaks, making repairs to leaks, generally due to internal corrosion, slip joints, expansion joints, flange leaks, and leaks at valves such as valve bonnets, customer requests for service turn-ons/off
- Scheduled inspections of manholes, pump locations (to reduce/eliminate water contacting the exterior of steam mains), slip joints, and steam traps
- Scheduled main shut-offs, main section isolation, and physical pipe replacement accomplished within an abbreviated shift; pipe replaced greater than five (5) feet in length is charged to capital budget
- Planned repairs
- Leak investigation and pinpointing.

To the extent project management process steps do apply, Steam Distribution Operations identified the project management process steps it carries out, albeit in a less structured manner. CECONY generally does not identify project managers for its steam activities and projects. Steam distribution addresses elements of project management by its project planners and supervisors (Chief Construction Inspectors and Construction Inspectors).

The bulk of capital projects and programs in steam distribution are of short duration, or performed routinely on an emergency basis (such as responding to steam leaks, or to problems found by employees). These activities may also include short sections for main replacements, expansion joint or flange joint replacements, manhole reconstruction, and projects resulting from analyses of vapor patrols.

3. Contract Management Section (Steam Operations)

A project management approach for steam distribution work is more closely addressed by the Contract Management Section that oversees all contractor work. Steam Operations contract management personnel control work other than “big ticket work greater than \$50,000” that is managed by Central Construction. Contractor crews perform excavation of steam line locations, such as a steam leak location. On a site-specific basis, a contract management inspector identifies how the job will be billed, determines whether time and material or a unit price \$/cubic yard will be employed, and monitors the worksite to document work items for contractor payments. A steam pressure shutdown is coordinated after the site is excavated as far as safety allows. Due to the presence of asbestos or escaping steam, the Environmental Health and Safety section performs asbestos abatement, with contractors supplementing this workforce. Steam distribution operations crews and contractor crews are then able to accomplish necessary work. Construction Inspectors on individual job locations are supervised by Chief Construction Inspectors, who oversee a number of job sites.

4. Field Operations Planning Section (Steam Operations)

CECONY’s project planners (Field Operations Planning Section) coordinate and accomplish project management elements along with supervisors, Construction inspectors, and Chief Construction Inspectors (CCI) from the Contract Management Section, to address individual elements of Project Management. Planners within the Field Operations Planning Section help ensure that goals and objectives are met. They do so by tracking and ensuring job priorities are maintained, customers’ steam needs are addressed, budgets are met, and personnel is adequate and scheduled. They also ensure that: (a) leaks pending repair do not exceed 6 months, (b) work meets permit restrictions to prevent permit violations, and (c) work is scheduled to minimize interference with proposed City and State construction projects affecting steam distribution facilities.

Planners provide an operations perspective to the elements of project management and contribute to project initiation, project scope, design, and closeout steps. To accomplish their work, planners must use multiple computer systems to identify projects, and to determine their scope, cost, schedule, permit limitations, customer needs, crew assignment, qualifications, contractor payments and work progress. The general work sequence is:

1. Planner’s function begins upon notice of a job report, generated on SOMIS, which lists all jobs pending due primarily to:
 - Leaks
 - Interference project
 - Planned program
 - System Improvement.
2. The planner reviews and defines the scope including any changes to the scope of the job to:
 - Discuss nature of job with Engineering for special requirements; *i.e.*, beaming, restraints (due to steam main contraction during shutdown of up to 3 inches per 100 feet of steel main), sequence of work activities, other work within space limitation shut down area, such as flanges, anchors or other pipe to be removed or replaced

- Contractor excavations to be made
 - Prepare main shut off (MSO) ready sheet to ensure the site has addressed asbestos abatement, breakout housing surrounding steam pipe, pipe work, welder requirements, define needed materials, identify any special conditions, permits from NYCDOT (street opening and traffic stipulations expiration dates).
3. Obtain approvals; as scope changes, this may involve further discussions with Engineering.
 4. The Planning Group schedules the main shut down considering:
 - Sequence of shutdown (Engineering)
 - System Requirements (Energy Control Center)
 - Customer Needs and Shutdown impact window limits.
 5. Discuss status and details of project at Bi-weekly Planning meeting; every Tuesday and Thursday, attended by Managers, Planners, Foremen, Welding Foremen, EH&S (personal protective equipment and asbestos monitoring), and Chief Construction Inspectors.
 6. Review project at daily meetings among CCIs and construction inspectors
 7. JOB DAY – Work is performed and pipe is installed.
 8. Pipe is re-energized (steam re-pressurized), Sequence engineer along with field operations supervisor ensures proper energizing sequencing of introducing steam back into the line to prevent water buildup within pipe and ensure working steam trap assemblies blow out any water formation. Ensure special instructions are accomplished.
 9. Site Restoration Work: contractor work accomplished including installation of insulation, housings poured and built, backfill, base pavement, asphalt, CCI verifies units for payment.
 10. Double check of units for payment of contract work.
 11. Determine whether the project cost is under or over \$100,000. If under, a manager approves the payment; if over, the General Manager for Steam Distribution conducts an inquiry.
 12. Follow-up checks made prior to payment for depressions in the street (settlement), pavement quality, and any residual steam leaks.

There are multiple, redundant checks on factors for payment. Factors are based on limits of working hours due to traffic restrictions and hours of work. Time and Equipment (T&E) may apply when the job must be shutdown for special asbestos abatement, when asbestos is found in the spoil/dirt being excavated.

CCIs and CIs monitor and track the cost of contractor work on each project. Field observations of steam distribution worksites indicated that the CCI was primarily concerned with the progress and quality of contractor work being performed and the units of work for contractor payment. Liberty did not observe application of formal project management processes per COP-10-0-5. These type of projects and programs did not demonstrate a program/project management focus of scope and individual project cost control.

Projects may be identified or initiated from:

- Customer or public complaints concerning vapor conditions
- Steam condition identified as a result of an identified leak, or vapor condition reported as a result of leak patrols

- PSC Safety Code required inspections, traps, manholes, patrols, etc.
- Work associated with meters, repairs, and improvements.

Projects identified are listed and scheduled (planned) and tracked on a monthly and on an annual basis. All work tickets are entered into CECONY's Steam Operations Mapping and Information System (SOMIS).

- Street work is tracked by individual jobs
- Addresses involving inside premises work
- Inspection tracking by type or nature of inspection activity
- Available personnel assigned to shifts.

Work implementation and completion

- Paper work identifies work accomplished in the field
- Mapping
- Man-hours
- Cost accounting reports.

5. Project Management Application

Larger steam projects lend themselves to more formal application of the project management process. These projects include some larger interference projects, new pipe installation or replacements, and steam tunnel reconstruction projects. Major Projects for 2008 within the following 5 capital programs (\$28 million budgeted) for which project management practices have been applied:

- New Business (possible new piping or pipe replacements due to new load)
- Interference (due to City and State construction projects)
- System Reinforcement (generally the largest amount of work is in this category), including:
 - o Remote Monitoring of water formation
 - o High Capacity Traps to address water and debris from materials used for sealing flange leaks, etc.
 - o New trap assemblies.
- Meter installation of demand meters
- Meter purchasing.

a. Interference Projects

In the planning stages and in the identification of project scope, Construction Management's Public Improvement Group interfaces with Steam Engineering Distribution Group to determine what needs to be done on City and State projects that may affect steam facilities or cause direct conflict with steam lines, which then must be relocated to eliminate the interference. These groups apply elements of Project Management as follows:

1. Scope of Project: parameters of work, engineering design drawings or "layout" of work to be accomplished
2. Funding and Appropriation Controls
 - a. Engineering Group prepares initial estimate.

- b. Steam Distribution reviews estimate, and determines final estimate of work for a budget line item (depending on timing of work; whether within one year versus within a 2-5 year time frame).
 - c. If the estimate is greater than \$100,000, Engineering prepares a budget appropriation request for approval by the general manager for Steam Operations, whose sign-off is required because funding will come from the Steam Distribution Budget.
3. Procurement and Construction: depending on the nature of work, CECONY may need to order special materials, perform spot buys, or prepare a specific bid contract for the work. CECONY will accomplish construction for ordinary or small projects through the normal term contract; larger projects are special bid.
4. Project Scheduling: during the steps identified above, Steam Distribution's Planners, Field supervisors (Chief Construction Inspectors) and Steam operations' engineers coordinate and implement project management steps, including: scope determination, planning and scheduling work, and ensuring customer shutdown window commitments and needs are met. Supervisors determine assignments for on site construction inspections to track contractor work and associated costs, review quality of work being accomplished, review deadlines and schedules of leaks that need repairs within 6 months, and deal with projects that may only be worked on weekends. Twice-weekly planning meetings are held between steam construction and operations to evaluate schedules and progress of various jobs versus due dates.
5. Monitoring project status and progress
 - a. VP of Steam, Plant Managers, Steam General Manager, Project Managers, and Project Engineers hold monthly status and issues meetings to review project estimates, budgets, versus actual jobs completed
 - i. Identify unusual conditions resulting in cost over-runs/increases
 - ii. Evaluate each project exceeding \$100,000 to identify cost drivers
 - iii. Evaluate Time and Materials/Equipment (TM&E) to determine possible unit prices, the most effective and efficient way to pay for projects and how to accomplish contracting work
 - iv. Determine if budget or other adjustments need to be made.

b. System Reinforcement Projects

System reinforcement projects include efforts to address locations where water is forming within the steam system, or where water is impinging on steam facilities. These types of projects include:

- Remote monitoring, a collaborative effort, among Steam Engineering, Construction Management, and Manhattan Electric Engineering, and may involve locations such as:
 - o Monitoring in steam trap assemblies, or new trap assemblies
 - o Monitoring water level in a manhole
 - o Water prone locations, an ongoing program, may involve bore holes to monitor water levels under the street, and analyses to determine corrective actions to reduce the water accumulating at the location
- Evaluations of water formation within the pipe, an ongoing program, which may involve an R&D project to identify a reliable sensor for the heat and pressure conditions.
- Traps inspection (under the O&M budget) to ensure steam traps are functioning properly
 - o Six times per year for operability

- o Every six months, the cap is removed and the trap is inspected for debris which might compromise the working of the trap assembly
- o CECONY replaces each trap annually

To further ensure condensate removal and trap assembly operability, the Company is implementing preventive and mitigative measures, such as replacing trap assemblies with debris dropout and strainers, and installing thermocouples to enable trap manholes and other vapor structures on the steam distribution system to be remotely monitored from its East 16th Street facility in Manhattan. The intent is to determine trap failures, identify those manholes with high water levels (causing condensate formation within steam pipes), and identify pump failures or water infiltration into structures. CECONY has already installed remote monitoring at 100 water vapor condition locations, and is evaluating how best to remotely monitor all 837 steam trap locations.

c. Steam Tunnel Reconstruction

CECONY performed a tunnel rehabilitation and piping replacement project at Park Avenue and 60th Street by its unit price contractor. The “steam” tunnels are located along Park Ave and contain steam lines and other utilities crossing beneath the Metro North Railroad lines.

During November, CECONY was performing tunnel reconstruction at Park Avenue and 58th Street, again by its contractor under unit prices. This project originally involved a flange steam leak and after initial reevaluation, evolved into replacement of seven 20” diameter flanges (some previously leak sealed with “seal-tek” or “leak-tek” processes), and related 1924 piping within the tunnel, upgrading the tunnel water pump controls and other associated electrical conduit.

Under a project management process, a tunnel project for Park Avenue and 35th Street has had its scope identified by an engineering consulting firm, plans drawn up, and a cost estimate developed for the work involved. Only one contractor bid on the work, so the project has been delayed possibly for rebid.

This type of tunnel rehabilitation work lends itself to project management, and should be planned and controlled by project management processes.

6. Lexington Avenue Incident Program Manager

CECONY has identified new projects and programs as part of the action plan following the July 2007 Lexington Avenue Steam explosion. A “project manager,” was hired to oversee and implement the Company’s Steam Action Plan. The NYPSC staff monitored its implementation and reported to the Commission on November 12, 2008 that CECONY has complied with the 13 recommendations for improving steam system operations and maintenance practices and procedures as set forth Staff’s February 2008 Report. The Staff report recommended bi-monthly and/or quarterly reporting by CECONY on implementation of remote monitoring systems to detect real-time water infiltration into steam pipeline facilities, such as manholes and tunnels, and a feasibility analysis of high-capacity steam traps and trap assembly designs to improve debris removal. CECONY will establish a \$4 million reserve account to be used to mitigate the

rate impact of operational and maintenance and capital expenditures made to implement safety-enhancement actions.

C. Conclusions

- 1. Central Operations Procedure (COP) 10-0-5 meets the requirements of project management process phases, but needs to provide further specificity for application to most steam distribution projects. (Recommendation 1)**

COP 10-0-5 provides CECONY's procedure for project management, addressing Project Initiation, Project Scope and Funding, Engineering Design, Construction, and Project Closeout. The standard defines the role of Project Manager, Discipline Engineer, Project Engineer, and Construction Manager. The procedure addresses integration, scope, time, cost, quality, human resources, communications, risk, and procurement management. Project managers are responsible for capital budget expenditures. At monthly meetings with financial analysts, project managers review progress on projects and associated expenditures to determine if project budgets are being met.

- 2. CECONY's use of its Project Management Procedure, as defined in Central Operations Procedure (COP) 10-0-5, to Steam Distribution Operations to projects estimated to exceed \$50,000, and its less formal treatment of smaller projects, are appropriate.**

The Construction Services Group or Central Construction Management is used for project expenditures in excess of \$50,000. This appears reasonable in light of the nature of work and scope of projects that exceed the \$50,000 threshold. Central Engineering provides support of steam distribution and generating stations through separate Civil, Electric & Steam Distribution Groups. Engineering Service Requests (ESR) identify project needs, engineering evaluates alternatives, defines project scope, develops designs, cost and time estimates and prioritizes projects based on evaluation of specific attributes, e.g., reliability. Competitive bids determine use of outside contractors. Project Engineering within Central Engineering assigns a project engineer to coordinate engineering support from receipt of ESRs through construction.

- 3. Steam Distribution Operations personnel do not receive sufficient training in work management principles and in applicable elements of COP 10-0-05. (Recommendation 2)**

While Liberty agrees that the application of a formal project management program is not appropriate for small jobs, those charged with managing these jobs can benefit from some of the principles and skills embodied in project management. Liberty did observe work on projects at various stages at field locations and the work performed would benefit from application of enhanced work management steps. Additionally, steam operations programs would also benefit from application of program/project management to focus on scope and cost control.

D. Recommendations

- 1. Identify projects requiring the application of project management techniques through a more formal, structured process. (Conclusion 1)**

The nature of steam distribution operations' programs and projects must be evaluated to identify those types to which project management should be applied. Further, once the nature of steam projects are identified suitable for project management application, COP 10-0-5 needs to be evaluated and revised to provide specificity on how project management may be applied to steam projects or a new COP prepared for steam distribution project management application.

2. Train steam distribution operations personnel in work and project management techniques. (Conclusion 3)

Project Managers, Steam Engineers, Steam Planners and Chief Construction Inspectors should receive training in project management processes.

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XVI. Electric Supply Procurement

Several years after electric restructuring in New York State, CECONY is required to procure electricity for “full-service” customers that have not switched to a competitive supplier. The number of full-service customers and the electric volumes purchased by CECONY have gradually fallen with the migration of customers. Further customer erosion is expected in the future, given the upcoming Commission requirement that more customers receive mandatory hourly pricing rather than full-service rates.

CECONY inherited as part of restructuring a number of large, legacy contracts with non-utility generators. The Company also signed at the then-prevailing market rates two longer-term contracts to serve the full-service load. The Company-owned East River steam/electric plant also has been redeveloped and provides a resource for meeting electric requirements. CECONY obtains the requirements remaining after these fixed resources from the marketplace through the NYISO, as anticipated by restructuring. The NYISO serves as a clearinghouse for electric capacity through auctions, and for energy and ancillary services through spot markets accessed by daily bidding.

Liberty’s primary criteria for evaluating CECONY’s electric procurement are whether the Company was:

- Utilizing the optimal mix of resources available
- Reducing price volatility through financial and physical hedging
- Considering all reasonable resource alternatives and options available
- Staffed properly with experienced personnel
- Documenting policies, procedures and controls for electric procurement.

The Company has generally procured electric energy effectively, recognizing the burden of the NUG contracts and the resource and transmission constraints unique to New York City. As the restructured electric markets have evolved, however, CECONY has not been consistently diligent in monitoring and maintaining the optimum resource portfolio to serve full-service customers. Importantly, the Company has not actively explored and pursued alternatives to its existing resource portfolio and NYISO purchases that may have been available in the marketplace, especially with regard to its above-market capacity supply. More active management of its electric supply resources is becoming even more important as the full-service load declines, and nears the level of legacy contractual obligations. Defining and developing an optimal, long-term resource portfolio plan and related hedging to plan for effectively meeting the declining full-service load is a current and future challenge that the Company must meet.

A. Background

Electric commodity prices have experienced significant overall increases in price and in volatility in the period following industry restructuring in most states. Effective management of price volatility requires the use of a structured, comprehensive, and flexible approach to portfolio management, which includes portfolio design and risk management. The utility industry has undergone significant advancement in these areas in recent years.

Setting comprehensive and specific objectives lays the cornerstone of effective management of energy procurement. Companies should adopt clear goals and objectives, and support them with sound operations and with effective physical and financial transactions. Without first specifying objectives to offer guidance and limits, a company is much less likely to design and manage a portfolio effectively. With respect to hedging, it is also necessary to provide a clear definition of goals, transaction types, counterparty qualification, and fuel use targets. Goals and objectives should balance price minimization, volatility mitigation, and supply reliability. Not all can be optimized independently, as progress in one aspect often comes at the risk of others. It is also important that the utility, its regulators, and stakeholders develop a mutual understanding of the way to strike this balance.

With respect to the direct procurement activities, it is important to assure that the process is efficient, conducted at arm's length, and transacted consistently with program objectives and that customers are getting prices consistent with the market. The need for strong controls and oversight is critical. The control elements of the process include the oversight roles of management, risk management, auditing and other organizations as appropriate.

The criteria by which Liberty evaluated supply procurement - electric included the following:

- Portfolio management and hedging
 - A comprehensive, structured portfolio approach, that derives from appropriate pricing, reliability, and volatility mitigation goals should guide supply procurement.
 - Clear goals should be established for the hedging program including specifically targets relating to maximum rate impacts and out-of-market risk.
 - Program goals should be clearly communicated and mutual agreement established between the Company and the PSC.
 - Portfolio design should be continually evaluated for consistency with goals and objectives, desired results, and regulatory guidelines and requirements.
 - Portfolio design should incorporate the established objectives, expected results of, and uncertainties surrounding demand and usage affecting programs and activities.
 - Portfolio design should incorporate the flexibility necessary to respond to other major uncertainties; e.g., supply disruptions, customer migration to competitive suppliers.
 - There should be a strong focus on liquid, transparent markets in electric procurement and price risk management.
 - Price risk management should be conducted pursuant to established and enforced policies and procedures.
 - The interests of customers should be the predominant drivers of policies and procedures for operation of the company's supply portfolios at the distribution level.
- Procurement and transactions
 - Procurement decisions should be consistent with portfolio design, should balance short- and long-term considerations appropriately, and should generally apply competitive approaches.
 - CECONY should take steps to assure a robust response by suppliers to assure competitive results representative of market conditions.
 - Procurement decisions should be clearly documented, subject to levels of approval commensurate with their costs and risks, and made according to comprehensive, appropriate procedures.

- Non-competitive purchases should require and routinely exhibit sound and complete documentation of their justification.
- Commodity procurement should be conducted pursuant to a well-defined process that has been adequately explained to all qualified suppliers.
- Bid evaluations, including application of specific criteria, weightings, responsiveness, and supplier performance history, should be conducted with analytical rigor and without bias.
- Approval processes should be consistent with the magnitude and risk of commitments involved, and with processes applicable to other major corporate commitments.
- Financial and procedural audits should be conducted routinely, to check for errors and assess compliance with procedures.
- Organization and Staffing
 - There should be separate and focused responsibility for each of the energy types procured and for financial energy transactions, and that responsibility should be exercised by personnel with levels of experience commensurate with the size of the energy portfolio the company is required to procure and manage.
 - Organization and staffing should be commensurate with the mission, goals and objectives of electric-supply procurement groups.
 - There should be adequate coordination with other corporate departments involved in or supporting electric procurement activities, particularly those responsible for gas procurement.
 - Key managers' experience levels should be consistent with those generally found in the industry in similar positions.
 - Planning must be supported by adequate analytical capability.
- Supply planning and management
 - The wholesale requirements must be understood and include ancillary services, transmission and other requisite wholesale services.
 - Unused assets should be marketed aggressively, to maximize benefits for customers.
 - Management/performance audits should be conducted occasionally, to ensure that procurement and contracting practices reflect industry "best practices".
 - Capacity planners should be aware of potential new markets and have at least a general sense of the company's ability to accommodate them, evaluate them and execute necessary services and products.
 - Capacity contracts should be consistent with quality and reliability objectives as well as credit and financial integrity.
 - Requirements estimation should be sufficiently accurate to avoid unnecessary risks of high-cost spot-market supplies.
 - The Company should take a proactive approach to NYISO's operations and contemplated changes in order to mitigate consequences to supply costs and reliability where it may be able to influence them, and in order to respond as effectively as possible where it may not.
 - The company should promote the identification, vetting and use of sufficient numbers and types of vendors to meet its needs.
- Risk management program and policies
 - There should exist a comprehensive risk management program that is approved and overseen by the board and, in turn, an appropriate senior management committee.

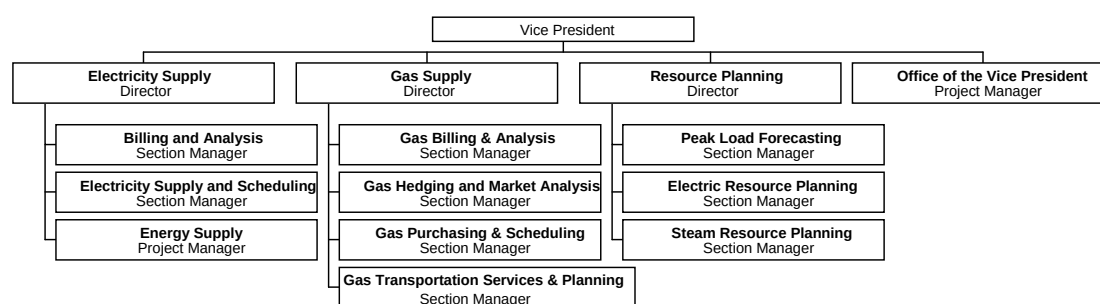
- The risk management program should contain all of the elements required to mitigate appropriately the risks that energy-related financial transactions impose.
- There should be ongoing, senior management and board review of supply procurement effectiveness, including review of portfolio components and targets, conformity of purchases to the portfolio, compliance with price mitigation and risk management programs and targets, and performance benchmarking against energy markets and other utilities.
- Counterparty pre-qualification and credit limits should operate under structured and rigorously applied criteria, with exceptions and violations regularly and faithfully reported and subjected to affirmative response.
- Hedging transactions should take place under a comprehensive program that applies volatility standards, identifies allowable transaction types for meeting those standards, establishes targets for total and by-transaction type, appropriately limits authorized traders, requires regular reporting of results, and faithfully reports and provides for an effective response to exceptions and violations.

B. Findings

1. Organization and Staffing

The CECONY electric procurement functions are performed as part of the energy management organization, reporting to the energy management vice president. Energy management includes both electric supply and gas supply functions, as well as a resource planning group. The next chart shows the energy management organization.

CECONY Energy Management Organization



The Electric Supply Department has the primary responsibility for electric procurement. Electric Supply includes three functional groups: electric supply and scheduling, electricity hedging and market analysis, and billing and analysis. Electric supply includes about 30 employees; the total energy management organization has about 90 employees. The Resource Planning department of Energy Management is also involved in planning for electric purchases through the Peak Load Forecasting group and an analysis function called Electric Resource Planning. Risk management functions for electricity are performed by the Energy Risk Management Group, which is part of the treasury organization.

a. Electricity Supply and Scheduling

This group performs the daily operations of buying and scheduling electric supply for CECONY. They monitor market information and trends to develop short-term purchasing strategies for energy for the Company's full-service customers. They manage the daily and seasonal purchases of energy required to serve the Company's load requirements. The dispatch rights of purchased power contracts are analyzed, managed, and executed on a daily and seasonal basis. The Supply Scheduling function also conducts daily operations with the NYISO, including the scheduling of all electric sources. The group also submits generation bids for the Company's steam operations cogeneration facilities, and bids for spot energy purchases from the NYISO on both a day-ahead and a real-time basis. Short-term electric transactions are also arranged with neighboring control areas, such as PJM.

b. Electricity Hedging and Market Analysis

This group develops and implements financial hedging activities for electricity in order to reduce price volatility. The hedging group monitors electricity, natural gas and oil market price forecasts and other market information to identify impacts on the Company's electric pricing. The hedging group also develops short and long-term capacity and electricity price forecasts. They negotiate financial hedging contracts with counterparties to prepare for supporting financial hedging transactions. Analysis is performed to determine the hedging plan on an annual basis. The hedging plan is executed by arranging hedges for the variable price components of electric supply, including NYISO spot purchases and bi-lateral contract purchases.

c. Billing and Analysis

This group performs verifications, tests, and checks of electricity purchase transactions. A primary responsibility is to verify the volumes and invoices of all purchases made from or through the NYISO. The group is responsible for verifying the pricing, volumes, accounting, paying and tracking of bi-lateral contract purchases. This group is also responsible for checking, verifying and negotiating the final invoices on all purchases of electricity. Responsibilities also include the preparation of reports on electric purchases to the Company rate department.

d. Resource Planning

This group provides planning information for electric procurement activities. Resource Planning, a separate department from Electricity Supply, also reports to the Energy Management vice president. Resource Planning provides peak load forecasts (short-term and long-term) for use by Electricity Supply. The peak load forecasts are developed for both the summer and winter seasons, and include both the total Company delivery load and the full-service customer load subset.

Resource Planning also includes an analysis group that performs electric system reliability and economic studies, and analyzes the regional electric markets. These analyses aid in the formation of company energy policies and positions, and to assist in evaluating electric resource options.

2. Electric Portfolio Design

Electric portfolio management is conducted by Energy Management under the direction of the Vice President, Energy Management. Portfolio management includes the planning, procurement,

and management of electric resources for those full-service customers who have not switched to a competitive electric supplier. Portfolio management includes the development of an electric resource plan, the procurement of the resources identified in that plan, and management of the resources on an ongoing basis. Effective portfolio planning and management provides utilities and their regulators with a systematic process for identifying and managing electric resources that will result in reliable service at reasonable rates. The first part of this process, as described in this section, is the formulation of a portfolio design or plan that provides a roadmap for the acquisition of electric resources over the long term. This planning is generally performed by the energy management vice president and his managers. The financial hedging and operational aspects of electric supply procurement are covered in the following sections of this chapter.

a. Portfolio Design Objectives

CECONY states its objective in the area of electric supply procurement as follows:

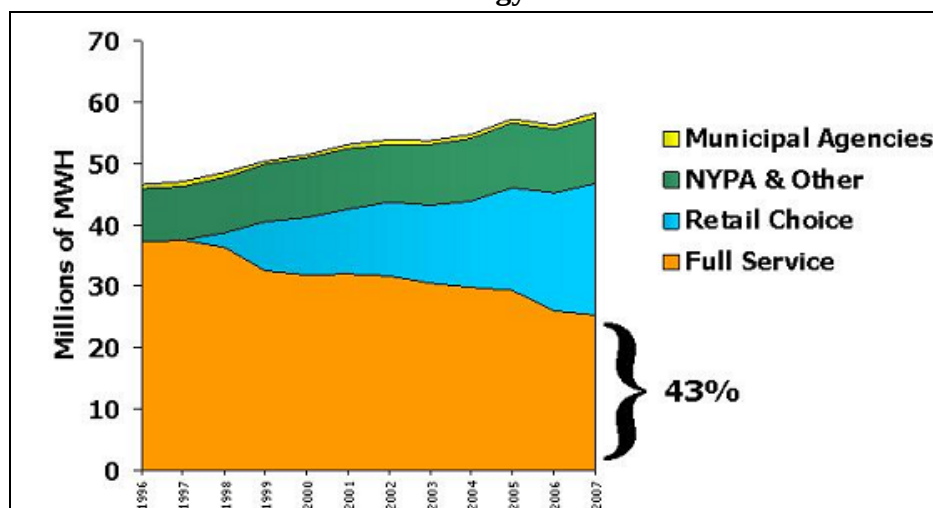
The company seeks the lowest reasonable costs for its customers, subject to reliability and contractual constraints. As part of this objective, it also seeks to mitigate price volatility.

The Company acknowledges that no other written policy, procedure or objectives related to portfolio design exist for electric procurement. The Company represents that little electric supply optionality exists for CECONY, due to the magnitude of contracts in place, and that they primarily comprise previously contracted supply resources. CECONY's portfolio management focus has been on overlaying hedges onto existing contractual positions to moderate the volatility of variable-price contracts and spot market purchases.

CECONY obtains electric energy and capacity primarily from three main sources: (a) contract supplies, which include several legacy non-utility generation (NUG) contracts and two major contracts with Entergy Nuclear Power Marketing and Astoria Energy, (b) steam-electric generation from CECONY's own East River plant, and (c) purchases made from the NYISO energy, capacity, and ancillary services markets.

CECONY's electric procurement strategies have evolved over the past several years following the restructuring of the state electric markets and the development of the New York power pool into an ISO. Electric restructuring required CECONY to sell its electric generating plants. However, the Company was required to retain several long-term NUG contracts. These contracts are relatively expensive when compared to market resources. The development of retail choice for electric customers has reduced the number of CECONY full-service customers and their electric requirements significantly. The next table shows that CECONY's full-service energy deliveries had declined to about 43 percent of total energy deliveries in 2007. Energy deliveries to the New York Power Authority (NYPA) and municipal agencies made up more than 15 percent of 2007 energy deliveries; retail choice (competitive suppliers) accounted for the remainder of deliveries. The significant decline in the Company's full-service energy deliveries and their load duration are important factors in planning for the procurement of CECONY electricity resources.

CECONY Energy Deliveries



CECONY peak electric load forecasts for the next 10 years predict further migration of full-service customers to competitive suppliers, as the next table summarizes. The continuing erosion of full-service customers and related electric load have important implications for the Company's forward-looking electric portfolio design.

CECONY Electric Load Forecast Projections

Year	CECONY			Service Area (net of DSM)		
	In-City	Westchester	TOTAL	In-City	Westchester	TOTAL
2007	5,660	1,060	6,720	11,755	1,795	13,550
2008	5,410	1,020	6,430	11,955	1,820	13,775
2009	5,190	995	6,185	12,135	1,840	13,975
2010	4,915	965	5,880	12,215	1,860	14,075
2011	4,765	955	5,720	12,320	1,880	14,200
2012	4,685	945	5,630	12,455	1,895	14,350
2013	4,610	930	5,540	12,590	1,910	14,500
2014	4,470	910	5,380	12,660	1,915	14,575
2015	4,360	890	5,250	12,755	1,920	14,675
2016	4,230	870	5,100	12,825	1,925	14,750
2017	4,155	865	5,020	12,955	1,945	14,900

b. Electric Supply Resources

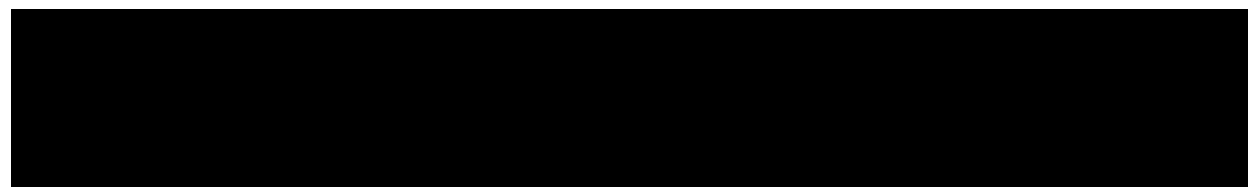
The primary resources in the current CECONY electric supply portfolio are contracts involving physical generating assets used by the Company to meet full-service requirements. The legacy contract foundation of the supply portfolio includes six major contracts with NUG generators; five of the contracts started during the period from 1992 through 1996. Four of these contracts give CECONY dispatch capability, and may be compared with energy market alternatives and purchases from the NYISO.

The six largest NUG contracts have nominal maximum contract volumes of 2,051 megawatts, and provide a substantial portion of the CECONY capacity and energy supply requirements. The NUG contracts provided about 22 percent of the CECONY capacity supply in 2007 and 2008. The next table summarizes these NUG contracts.

CECONY Major NUG Electric Contracts

Contract	Nominal Volumes (MW)	Dispatch Status	Contract Term	
Brooklyn Naval Yard	280	Must Take all	1996-2036	
Indeck Corinth	131	Yes	1995-2015	
Linden (East Coast Power)	618	Must take 300, dispatch above 300	1992-2017	
Selkirk	265	Yes	1994-2014	
Sithe Energy	705	No (Capacity only)	1994-2014	
Westchester Resco	52	No	1984-2009	
Total	2,051 MW			

The large contracts involving the Entergy nuclear plants and with the Astoria Energy plant comprise a second major component of CECONY's electric supply. The Entergy contract, like the NUG contracts, is a legacy of the electric restructuring process. The Company had owned the 1,000 MW Indian Point 2 nuclear unit, which was sold to Entergy as part of electric restructuring. Entergy also acquired the adjacent Indian Point 3 plant from NYPA. CECONY contracted with Entergy for fixed-price capacity and energy. Following the expiration of the original contract in 2004, the Company and Entergy have negotiated additional fixed-price contracts totaling 1,000 MW of capacity and energy for the last several years. The terms of the renewal contracts have been staggered, and arranged in three-year tranches. As a result, either 350 or 300 MW of the total under contract expires annually, and CECONY has the option to add another year to the end of the term at the expiring volume. Fixed prices for capacity and energy for each new three-year tranche are negotiated. CECONY buys one-half of the output of Indian Point 2 and Indian Point 3. The current contracts are for a full 1,000 MW, 24 hours per day and 365 days per year. The base load nature of these contracts causes them to provide about 30 percent of the Company's electric energy requirements. The fixed price feature of the contracts also acts as a physical hedge against electric price volatility.



██████████ In its most recent contract option renewal with Entergy, CECONY elected to contract for only 200 (rather than 350) MW for 2010, as forecasts of its load duration curve indicate the need for lower purchases in this period.

The Astoria Energy 500 MW contract is CECONY's second major marketplace contract. The Company issued an RFP in December 2002, requesting proposals for in-city generation. Both the Company and the Commission were interested in stimulating more electric supply and competition in the city. The focus of merchant generators in New York City has been in Astoria Queens, which is the site of some of the older plants previously owned by CECONY and adjacent development sites. NYPA built a 500 MW combined cycle plant that went online in 2006. The result of the CECONY RFP process was a 10-year contract with Astoria Energy for the full output of a new 500 MW combined cycle plant, which also came online in 2006. CECONY is required to take the full 500 MW of energy production, five days per week and 16 hours per day. CECONY has the option to schedule power for off-peak hours on evenings and weekends. The energy price is based on market natural gas prices, as are essentially all newer contracts for non-nuclear generating units in the marketplace.

CECONY Market Electric Contracts

Source	Nominal Volumes (MW)	Dispatch Status	Contract Term	██████████
Entergy Contracts	1,000 thru 2011 850 in 2012	Must Take for all hours	2001- 4/30/2012	██████████
Astoria Energy	500	Yes	2006-2016	██████████

In 2007 and 2008, the Entergy and Astoria contracts provided about 19 percent of the CECONY capacity supply.

The CECONY-owned East River complex, including units 1 and 2 (East River Repowering Project, or ERRP) provide another source of electric supply. The first priority of these cogenerating, combination steam and electric plants is to produce steam for the Company's Manhattan steam system. The two repowered co-generation units at East River also provide about 360 MW of electric capability; ERRP became fully operational in 2005. In addition to these units, the East River station complex includes legacy units #6 and #7 that provide additional electric capability of 156 MW and 200 MW, respectively. [Note: These are generator capability values and are not UCAP ratings associated with NYISO UCAP requirements and payments. East River's actual UCAP ratings are lower those than stated above, as they are based on dependable maximum net capability (DMNC) test results and forced outage (EFORD) rating impacts.] The electric energy produced for CECONY is not determined by an electric dispatch, but by the CECONY steam department for steam generation requirements. The East River complex is expected to provide about 7 percent of the CECONY capacity supply.

The CECONY steam department owns the ERRP co-generation units and charges 66.4 percent of the fixed costs of the East River Repowering Project to electric supply. Additionally, the fixed costs associated with legacy units #6 and #7 are charged fully to electric supply. These charges have resulted in the following costs for the East River complex capacity resources since 2005.

CECONY East River Station Complex Capacity Costs

	2005	2006	2007	2008
MW Months of Capacity ¹	8,592	8,592	8,592	8,592
Annual Electric Capacity Charges .	\$269.7 MM	\$249.1MM	\$248.4MM	\$260.6 MM
Capacity Costs (per kw month)	\$31.39	\$28.99	\$28.91	\$30.33

¹ at 716 MW total station capability

c. Capacity Requirements

The NYISO has established an 80 percent locational requirement for load serving entities in New York City (Zone J). The locational requirement establishes a standard requiring that about 80 percent of the resources to meet electric load in the city be located within the city, in order to ensure voltage support and the reliability of the system. CECONY must have either owned in-city generating capacity (such as East River) or firm capacity contracts with either in-city generators (such as Astoria Energy) or with generators that have dedicated transmission lines directly into the city (such as Linden/East Coast Power) equal to or greater than: (a) 80 percent of its in-city peak load, (b) plus a 16 percent reserve margin. CECONY's in-city capacity, acquired through its contract purchases and from East River fall far short of the locational capacity requirements. CECONY must therefore buy large quantities of in-city contracted capacity to meet the requirement. CECONY meets its incremental capacity requirements by participating in the NYISO's installed capacity (ICAP) auctions. The ICAP auctions include three types: strip, monthly, and spot.

Biannual NYISO capacity auctions offer six-month "capacity strip" contracts. The strip auctions occur in April for the summer (May-October) contracts and in September for the winter (November-April) contracts. CECONY Energy Management may bid in this auction for its capacity requirements for the entire six-month period. A second opportunity comes with the monthly auctions, where bids can be made for the upcoming forward month and any other months remaining in the same six-month capability period. The third and final opportunity to buy capacity prior to delivery is the spot auction, where the ISO acts on behalf of the load serving entities, and assigns capacity to cover any shortfalls at the spot auction clearing prices.

The Company buys all of the additional capacity (above its long-term firm capacity contracts) required to meet its locational capacity requirements from the ISO. Prior to 2007, New York City merchant generators were prohibited from selling their in-city capacity through bi-lateral contracts on a long-term basis, in order to reduce the market power of the dominant merchant generators. In addition, the in-city generators must first offer their capacity to the NYISO before it may be sold to other parties. The Company currently purchases all of its in-city capacity requirements from the ISO. Informal markets for capacity purchases also currently exist through brokers and through direct purchases from generators. The NYISO is also considering the development of a forward market for capacity purchases for up to three years in advance. The Company observes a surplus of capacity in New York City currently, and noted that capacity prices from the ISO declined significantly in 2008. The Company purchased about 48 percent of its capacity supply from the ISO in 2008, at an average cost of \$3.98 per kilowatt month. The table below summarizes CECONY capacity purchases from the NYISO from 2005 through November 2008.

CECONY Capacity Purchases from the NYISO- 2005-2008

	2005	2006	2007	2008
MW	62,538	51,261	46,539	45,044
NYISO Total Cost	\$419.9MM	\$326.0 MM	\$314.8 MM	\$179.2 MM
NYISO \$/kw mnth	\$6.71	\$6.36	\$6.76	\$3.98

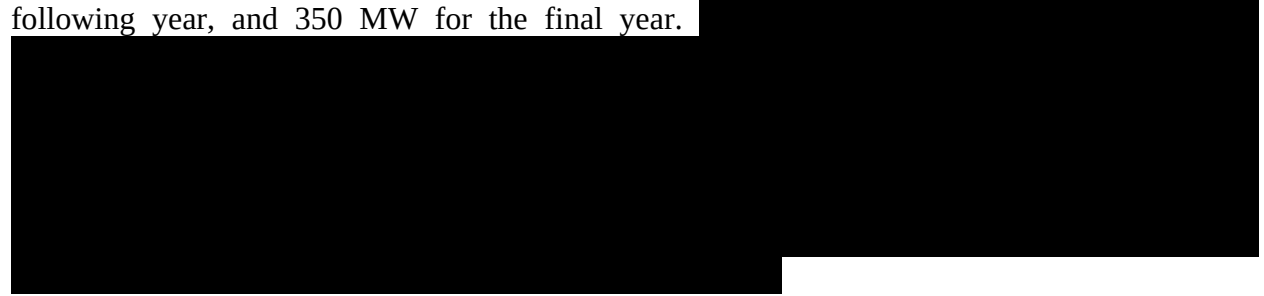
d. Historical Procurement Options

In late 2002, CECONY solicited proposals to provide electric capacity in New York City as part of its electric procurement program. The RFP requested bidders to supply the Company with 500 MW of new electric capacity in the city for up to 10 years, starting no later than May 1, 2006. The Company required that the capacity be sold under a capacity supply agreement, that it be from a combined-cycle or baseload facility, newly built, and electrically located in New York City. Electrical location in the city could occur through an in-city location or an out-of-city facility connected to the CECONY system through a new, dedicated transmission line. The Company was interested in securing the capacity resource and in helping to develop a city capacity market.

The Company received 21 proposals, evenly split between generation plants and transmission line options. CECONY screened the proposals under a variety of criteria. The primary criteria were meeting the RFP specifications and the economic value and pricing, which included the value of capacity, the value of energy options (if offered), and the level of risk involved. Secondary criteria were environmental considerations, interconnection with Company grid locations, reliability impacts, permitting issues, fuel capabilities, and financial and credit stability of the bidder.

The Astoria Energy proposal met all of the CECONY requirements. Its economic valuation on a 10-year, net present value basis ranked among the highest. It also had the additional potential value of a permitted second unit at the site. Other positive factors were a capacity price cap, excellent interconnection and support of the 138kv and 345kv systems, and a favorable environmental impact. The Company signed a 10-year contract with Astoria energy for capacity from the plant, which was completed in early 2006. CECONY also signed a contract to buy energy from the plant for 16 hours each weekday.

CECONY performs an annual analysis and negotiation of the options for extending the Entergy contract, which was described above. The Company has annually negotiated with Entergy for a tranche of three years of capacity and energy; 350 MW for the first year, 300 MW for the following year, and 350 MW for the final year.



An annual memorandum was presented to the Finance Committee of the Board of Trustees recommending that the option for each of the tranches shown above be executed. Each of the annual memorandums compares the Entergy contract option to expected market prices, and recommends the Entergy contract option based on the fixed price, physical hedge feature, as well as estimates of savings to customers versus the market purchase option.

e. Procurement for Future Requirements

CECONY Energy Management believes that the Company has adequate physical electric purchases under contract through at least 2012. The Company has not been interested in adding additional long-term electric supply contracts in recent years. CECONY full-service customer load is steadily eroding over time, resulting in the need for less base load power and firm contracted resources. The Company is also concerned that the addition of long-term purchase contracts could result in excess generation resources in the future. These opinions are based on existing supply contracts, load forecasts and forecasted load duration curves through 2012.

CECONY Energy Management reviewed the Entergy contract extension option, and considered other electric supply alternatives in 2008. The Company had previously contracted for Entergy contract tranches 1 through 5, which provided for the purchase of capacity and energy of 1,000 MW in 2009, 650 MW in 2010, and 350 MW in 2011. Entergy offered “tranche 6” for 350, 300 and 350 MW in 2010, 2011 and 2012, respectively. The Indian Point 2 and 3 nuclear licenses expire in September 2013 and December 2015, respectively, making the availability of a “tranche 7” through 2013 uncertain.

Energy Management considered and presented to the CEO the Entergy contract option and alternatives, load duration curves, and the sufficiency of electric supply resources for the 2010-2012 period. Expanding the purchases of energy from the NYISO, hedging these purchases with financially firm hedges, and purchasing capacity in the NYISO spot and strip auctions was considered as one alternative to the Entergy tranche 6. However, the collateral posting requirements for ISO energy purchases and the higher estimated cost of capacity purchases made this alternative less attractive. The hedged price would also be more variable than the Entergy

fixed price. The counterparty credit requirements for the financial hedges also became much more problematic in the fall of 2008 with the national and worldwide financial market problems.

Energy Management also considered an electronic financial auction for purchasing energy from the NYISO, a variation of the previously described alternative. However, this option would have the same drawbacks, and also became less viable in the constrained credit markets.

A third alternative considered by Energy Management in 2008 was a physical supply auction to find one or more transactions to cover the same three-year period as Entergy tranche 6. A physical supply auction could determine feasible in-city and out-of-city supply options, and reduce the collateral/credit drawbacks of NYISO energy purchases while increasing scheduling flexibility. However, CECONY was concerned with increased in-city congestion costs, high natural gas costs and related in-city generation costs.

Energy Management refined its analysis of resource requirements and alternatives in August and September 2008, prior to the October 1 deadline for the Entergy contract extension. Revisions to the load duration curve and the physical supply sources caused the relationship of requirements and supply to change. The revised analyses presented in August and September 2008 indicated that the full exercise of Entergy tranche 6 could cause CECONY to be over-supplied in all three of these years. The consideration of additional full-service load migration for customers above 1,000 and 500 kilowatt loads would cause even greater levels of over-supply. The revision of the requirements/firm supply relationship forecasts caused the Company to reconsider contracting for the full Entergy supply offered. [REDACTED]

The alternative of replacing the Entergy contract volumes with NYISO purchases and financial hedges was also re-evaluated; increases in collateral requirements and the thinning market for financial hedges effectively eliminated the consideration of this option.

Energy management eventually recommended that an option for 200 MW (rather than the 350 MW offered) be exercised for 2010 only. [REDACTED]

[REDACTED] No contract options were exercised for 2011 and 2012. [REDACTED]

[REDACTED] By not exercising the full Entergy contract options, the Company is improving resource flexibility for 2010-2012 to address load uncertainties due to retail choice and mandatory hourly pricing proposals.

f. Monitoring of NYISO and Market Developments

The Energy Markets Policy group is responsible for monitoring regulatory developments and formulating positions on wholesale energy market issues, including proposed transmission resources and market rules. The group issues regular intra-company reports, and coordinates with other subject matter experts within the Company to develop positions on state and market energy issues that affect CECONY and its customers. Energy Management also participates in numerous committees at the NYISO. For instance, the Energy Efficiency department attends meetings of the NYISO price responsive load working group, and the electric billing and analysis group attends NYISO task force and working group meetings relating to billing and accounting matters.

Electric Resource Planning employees work in conjunction with the NYISO in modeling the regional electric system. They have input to the annual resource planning process covering a 10-year forward horizon, known as the NYISO comprehensive reliability planning process. The NYISO uses a modeling system known as MARS (the multi-area reliability system). The Company notes that the state reliability planning process is a collaborative process that includes all market participants in the NYISO.

Electric Resource Planning also maintains in-house models to provide its own access to regional reliability and market area production costing information. The MAPS model is designed to attempt to mimic the NYISO's MARS (Multi-Area Reliability) modeling system. The MAPPS model has a different purpose, providing market area production costing for the Northeast region. Electric Resource Planning performs market analyses that are "macro" in nature, using them to provide information for the development of corporate energy policies. The group also performs analyses of the economic impact of new proposed generation and transmission projects in the region, and estimates their effect on regional energy pricing. For instance, the impact of a new resource such as a 2,000 MW capacity transmission line may be analyzed by Electric Resource Planning. Such an analysis would have a goal of determining the impact that the transmission line would have on regional and CECONY-area pricing. Analyses have also been performed on generating assets, such as major offshore wind projects or underwater DC transmission cables. These analyses are performed to determine if CECONY should support or oppose such projects at the NYISO or the NYPSC.

Electric Resource Planning also prepares miscellaneous analyses on the macro-economic impact of electric resource projects that may be developed by CECONY. For instance, the group analyzed the repowering of the Hudson Avenue station to produce steam and electricity. An analysis of the market price considerations of the planned M-29 transmission project was prepared for consideration regarding that project. They have also performed more macro-level

analyses of DSM projects on the CECONY system using production cost simulation to determine the economic value of deferring substation projects through DSM.

3. Electric Supply Hedging

Liberty's findings in this task are presented in four parts. Those parts are as follows:

- Hedging Goals and Objectives
- Annual Hedge Planning
- Hedging Transactions and Procedures
- Hedging Results.

a. Hedging Goals and Objectives

CECONY purchases financial hedges to reduce the price volatility of electricity for its full-service customers. The Company hedges electric price risk in three areas. Energy from NUG contracts has variable pricing, based usually on market or the generator's natural gas costs. Natural gas is also used to fuel the Company's East River steam/electric cogeneration, which provides a portion of the electric supply. A third area of electric pricing volatility is from energy volumes purchased from the NYISO. CECONY hedges the variable price risk of each of these three areas through financial instruments.

The primary goal for CECONY hedging programs is to prudently hedge the cost of electricity and natural gas. The NYPSC has provided the direction to minimize price volatility as the key objective. CECONY Energy Management also represents that it is attempting to limit the high-end exposure for commodity prices. The NYPSC established the following regarding hedging in its 2004 Retail Market Policy Statement:

... it was determined that electric utilities should maintain balanced commodity supply portfolios - characterized as neither 0 percent nor 100% hedged - for serving residential and small commercial and industrial (collectively, mass-market) customers.

In 2007, the NYPSC followed this statement with a proceeding regarding the policies, practices, and procedures for utility commodity supply service for mass-market customers. The Order in this proceeding concluded that:

Utility hedging of price volatility for the benefit of mass-market customers shall continue. Most mass-market customers expect and desire that utilities will offer a regulated product that limits volatility, and charging a stabilized rate to mass market customer service classifications is a traditional utility rate offering.

In a follow-up NYPSC proceeding in early 2008, CECONY represented that, based on its prior three years of experience, constraining volatility to a 10 percent range as measured by the coefficient of variation sets a reasonable tolerance band, and serves as an acceptable goal for constraining its electric commodity price volatility. However, the ensuing Order established the combination of standard deviation and CoV (covariation), taken together, as appropriate metrics to measure price volatility. The metrics are to be used to establish goals rather than to operate as

strict standards. The Order also established quarterly reporting by the electric utilities of wholesale electric market prices and their hedged portfolio electric supply prices for the previous 12 months. The reports must also include the 12-month rolling averages for standard deviation and CoV for both prices.

The Company provided the following as a statement of its principles, goals and objectives regarding electric price volatility (note that no quantitative goals are set):

Both CECONY and O&R seek to procure electricity for their customers on an economic basis, subject to reliability and contractual constraints. As part of this objective, they also seek to mitigate price volatility associated with the wholesale cost of electricity. To accomplish these objectives, the companies actively pursue the use of financial hedge instruments.

b. Annual Hedge Planning

The Electricity Hedging and Market Analysis section of energy management performs a hedging optimization study and an annual hedge planning process that have the goal of determining the optimal level of hedging. The starting point for the process is the load requirements for electric sendout. The send out for full-service customers is determined, and then compared to the physical electric supply that has been contracted by CECONY. The difference, or required NYISO spot purchases, provides a base data point for the process. The historical range of spot NYISO purchase prices is used as an analysis range.

Market information for natural gas is used in the optimization study, because:

- Gas-fired electric generation is “on the margin” in the region
- Better historical data on natural gas markets is available
- Natural gas as a more liquid market than electricity.

Natural gas pricing is then converted to electricity pricing using an average heat rate.

The wide range of price possibilities considered is determined by including prices up to two standard deviations from the forecast mean. Test portfolios are assembled with varying hedge percentages and including hedged futures prices. The variables for the test portfolios include hedging percentages of zero, 25 percent, 50 percent, 75 percent and 100 percent. Another variable tested is the percentage of the hedges purchased as monthly contracts versus calendar strip hedges. For the most recent optimization study (for the years 2009 through 2011), varying levels of Entergy contract purchases were tested. A Monte Carlo simulation performs many iterations within the ranges, after which CECONY determines an optimal mix of variables. The analysis is forward-looking for three years on a rolling basis.

NUG contract hedges undergo a separate optimization analysis. The same range of hedge percentage ratios were evaluated for CECONY’s key dispatched NUG units (Linden, Indeck and Selkirk). Both the NYISO and NUG analyses determined the estimated range of prices and a mean electric price under the various assumption permutations. The resulting recommendation was for CECONY to hedge 75 percent of expected NYISO purchases, and 75 percent of the contracted NUG purchase volumes, based on lowest price volatility criteria. The analysis also

determined that the full exercise of the Entergy contract is most favorable from a volatility standpoint. The Company determined later in the year that the full Entergy contract was not required due to declining load requirements. The following chart shows the optimal hedging percent option (circled) and other alternatives considered.



Following the presentation of the analysis and recommendation to CECONY executive management, a memorandum is prepared to the Finance Committee of the CECONY board of directors, with the hedging recommendations.



Following the approval of the hedging recommendation, a hedge procurement plan is prepared for the following three years. The plan lays out specifically how the planned hedges will be procured, and the planned timing of the hedge purchases. Because the plan is for 36 months, the Company generally will plan to purchase 1/36 of the hedging instruments in each month. Market

events such as extreme changes in prices could slightly change the plan. However, the Company's base hedging strategy is to "dollar cost average" the hedges by contracting for a relatively stable volume in each month. This programmatic approach is intended to minimize price volatility over time. The Electricity Hedging group is allowed the flexibility to adjust purchase volumes by 20 percent above or below the monthly plan volume of hedges in response to market events or trends.

CECONY primarily uses futures and options to hedge positions. A common hedging contract is a CFD (contract for differences). The Company also uses calls, puts, swaps, options, and swaptions¹ to a lesser degree. These instruments essentially represent combinations of the two basic instruments (futures and options).

CECONY has in place a list of 12 to 15 approved counterparties, each with an unsecured credit limit. The Electricity Hedging contract administrator works with the legal department on the actual ISDA contracts signed with hedging counterparties. After the signing of a hedging contract, the energy risk management group in Treasury oversees the contract.

c. Hedging Transactions and Procedures

Liberty reviewed and observed the Electricity Hedging group's daily processes for buying energy hedges. The financial hedge traders first gather market and operating information from the electric supply and scheduling morning meetings. They check electronic market sites, informational e-mails and newsletters, and market opinions and forecasts, which are sent by market contacts and experts. They also review the hedge procurement schedule (Hedge Target Report) for both the current month and for the rest of the year according to the annual hedge plan. The traders discuss the market and review pricing information from FutureSource and ICE to review yesterday's prices. The hedge purchases are for electric NYISO and East River hedges, and for NUG contract hedges. All hedge transactions and settlements are financial, using mostly futures, options and swaps.

A planning spreadsheet captures the hedge purchase targets for the current, previous and future months. This spreadsheet provides a running total of the hedges purchased and the remaining purchases required to meet monthly targets.

Potential transactions are discussed with approved counterparties. Once a transaction is arranged, the traders fill out a simple paper transaction ticket. The paper ticket is then entered into the Allegro system by an analyst, thus turning the paper transaction into an electronic ticket so that it may be reviewed and confirmed by various internal parties. The transaction terms are reviewed with the Electricity Supply manager for approval. The transaction is checked by the contract administrator of the Electricity Hedging group. The Allegro system provides a daily activity report of all transactions arranged.

¹ A "swaption" is an option to swap; i.e., an option that grants the right (but, unlike a simple swap, not the obligation) to enter into a defined swap, which, in the energy business often involves trading a fixed for a floating (index) price, or trading two floating prices defined by different indexes (e.g., monthly versus daily).

For gas hedges on the electric commodity, the Company hedges up to three years, currently through 2010 and into 2011. More monthly electric hedges are planned and purchased in the summer due to higher electric loads and NYISO (peaking) purchases. Gas hedges for the NUG contracts are also at higher volumes in the summer months.

CECONY prefers to hedge with calendar strips, because they comprise the best vehicle for reducing volatility. This is especially true for hedging NYISO spot electricity purchases. The pricing of calendar strips tend to be fairly flat; therefore, their use will reduce volatility to a greater degree than would buying individual monthly hedge transactions that are re-priced each month. The calendar strips are also more helpful in mitigating pricing levels. The calendar strips are, however, becoming less practical for hedging electric supply, because CECONY's shoulder load profile is falling below firm supply at various times during the year, making over-contracting with the calendar strips more of a danger.

Energy Management's electricity hedging manual sets forth controls, procedures, and authorizations for electric hedging transactions. The manual also refers to several corporate policy statements or corporate instructions that govern hedging and risk management operations, as discussed in the risk management section below. The manual first sets forth some basic descriptions and controls:

- Hedging description
- Speculative Trade Policy
- Separation of Duties
- Delegation of Authorities
- Authorizations Policy
- Approved Instruments Policy
- Authorizing Counterparties Policy
- FERC Standards of Conduct.

The manual also provides specific procedures for daily operations:

- Procedure for Execution of Daily Hedge Transaction
- Procedure for Verifying Transaction Confirmations
- Procedure for TCC Transactions
- Procedure for Margin Call Funding and Margin Refunds
- Procedure for Acquiring New Contracts
- Procedure for Maintaining Existing Contracts.

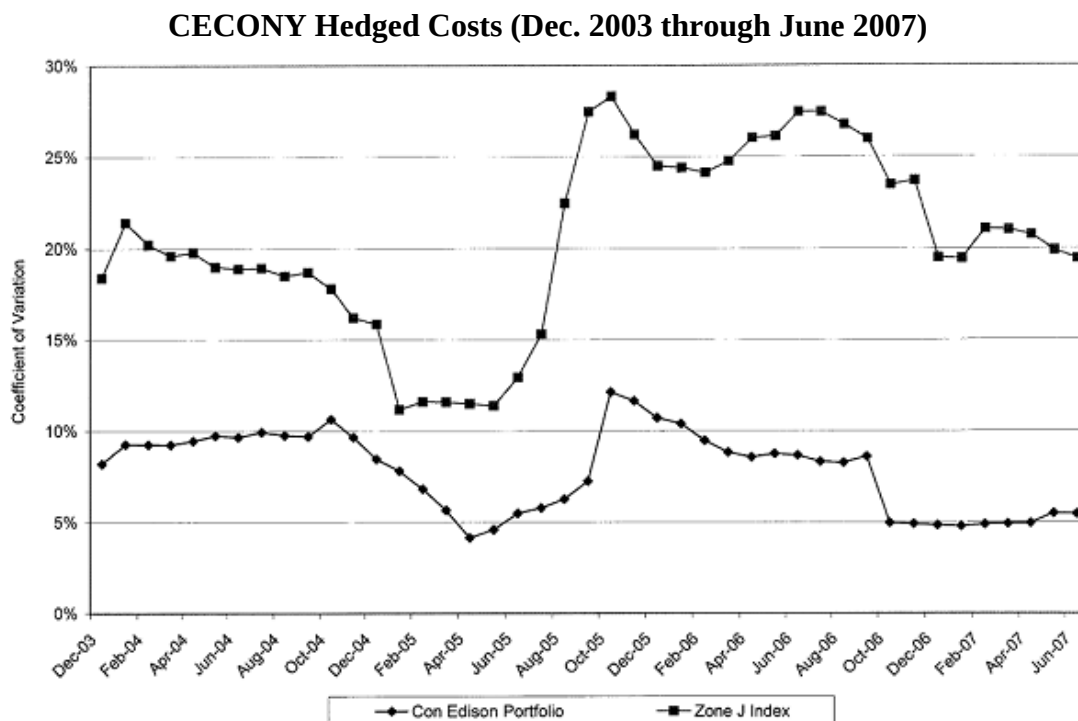
CECONY has been involved in developing the Allegro transaction database for some time, but it is not yet fully integrated. Spreadsheets are still maintained to provide a parallel information database until implementation is complete. The system was originally expected to be in place in early to mid 2007, and is far behind schedule.

Allegro will provide a common transaction information database for four separate, but inter-related energy management groups: electric scheduling, Electricity Hedging, gas physical scheduling, and gas hedging. All physical and financial energy transaction and position

information for the gas, electric and steam business will be included in one integrated database system. Energy Risk Management needs the Allegro capability to more easily confirm and review transactions. The contract administrator also will track transactions in Allegro. The key report generated by Allegro is the Daily Activity Report. Allegro also helps the energy procurement groups to share information between the energy management functional groups. Allegro also improves the controls processes by recording the approvals required and obtained for each transaction; the energy supply manager, contract administrator and Energy Risk Management must each approve all transactions.

d. Electric Hedging Results

The following graph was provided by CECONY to the NYPSC in 2007 as a comparison of Zone J wholesale market electric costs and the CECONY hedged costs from December 2003 through June 2007. The graph shows monthly average volatility on a coefficient of variation basis. The graph shows that CECONY's hedged purchase costs were significantly less volatile than the spot market. The Commission now requires that CECONY and other NYS utilities post their pricing levels publically and file them quarterly with the Commission. Reports include the most recent 12 monthly hedged and market prices, 12-month average hedged and market prices, and standard deviation and coefficient of variation of the 12 monthly hedged and market prices.



4. Risk Management Processes

The hedging programs for the gas-supply and electricity-supply functions are overseen by a Corporate Risk Oversight Committee, and a Regulated Risk Management Committee. The charters, membership, responsibilities and authorities given to the two committees are provided in Corporate Instruction CEI-205, Energy Risk Management. In general, the Risk Oversight

Committee establishes risk policies and limits for the Company's gas and electricity procurement obligations, including energy procurement, hedging and trading. The Regulated Risk Management Committee focuses on the mechanics of the utilities' (CECONY and O&R) compliance with the risk-management policies and procedures. The two committees meet monthly to review the performance of the hedging programs, and to discuss issues within their respective purviews. Each receives a report and presentation that includes analysis and charts regarding the followings topics:

- Market prices
- Controls review
- Financial instrument and credit review
- Energy Risk Management updates
- Gas and electric portfolios – prices and volatility
- Market and regulatory outlook.

CECONY has an Energy Risk Management staff to serve as the operations group responsible for verifying hedging transactions and checking them for compliance with policies and procedures. They do not verify or check for procedural compliance on energy supply transactions; their focus is specifically on financial hedging. Energy Risk Management also monitors the credit positions of both the Company and its counterparties, and initiates any necessary actions if credit positions move out of compliance with the respective agreements with each counterparty. Energy Risk Management reports to the Vice President and Treasurer, who chairs the Regulated Risk Management Committee. Energy Risk Management also serves as staff to the Regulated Risk Management Committee.

The two committees and the Energy Risk Management staff conduct their work pursuant to Corporate Policy Statement 620-1, Energy Risk Management Policy. The Energy Risk Management staff developed Energy Risk Procedures (ERM-100) and Energy Credit Procedures (ERM-200). These two key documents provide the procedures, measurements, risk limits, authorizations, and other controls with which the ERM staff monitors compliance. Energy Risk Management was constituted in 2001 and the two sets of procedures were its first task. Issued initially in 2002, the procedures have been updated several times since then. The procedures are "owned by" the Regulated Risk Management Committee, which must approve any revisions to them.

One of the duties of the Regulated Risk Management Committee is to consider specific hedging strategies to be employed by CECONY's gas and electricity hedging personnel. These strategies address particular hedging instruments (*e.g.*, futures or options), and the circumstances in which each one might be used (*e.g.*, the use of futures contracts in hedging flowing gas). Each such strategy was written up initially for presentation to the Regulated Risk Management Committee in 1997, and had to be approved by that Committee prior to its use. At least some of the strategies have been modified since that time, but each modification had to be presented to, and approved by, the RRMCM.

CECONY is currently in the late stages of implementing a sophisticated new position-tracking system, intended to incorporate physical and financial positions for all of the Company's utility businesses. Acquired in response to a recommendation from the Company's external auditors,

the new system will replace a variety of spreadsheet applications. The new system (Allegro) will also facilitate controls, as it tracks and records approvals for each transaction.

The credit risks of both the Company and its counterparties have become a concern as a result of the severe conditions in the financial markets in 2008. CECONY maintains a list of 12 to 15 approved counterparties. Each approved counterparty is assigned an unsecured credit limit based on its credit rating; this unsecured limit is the amount of credit that the Company will extend without requiring a collateral posting for security. CECONY's counterparties have credit ratings ranging from BBB- to AA+. These ratings have corresponding unsecured credit limits ranging from \$5 million to \$40 million. Many of CECONY's approved counterparties are financial institutions (7 of 12 at October 31, 2008). With the steep decline in financial standing of the financial services industry, the ability of the approved counterparties to enter into or perform in hedging transactions is less certain. The Company has represented that they have not had any instances of counterparty non-performance due to credit problems, and that no counterparties have been removed from the approved list due to credit issues.

CECONY performs credit "stress tests" on a quarterly basis to determine the potential effect on its liquidity position of extreme changes in market fuel prices or in its credit rating. These factors have combined to cause liquidity problems at a few utilities with heavy trading positions in 2008. The Company reports on these stress tests for the credit rating agencies, who are monitoring collateral requirements and their liquidity impacts much more closely of late. The Company demonstrated to Liberty that "worst case" analyses of extreme changes in market energy prices and CECONY credit ratings would not cause liquidity problems.

Occasionally, the Regulated Risk Management Committee studies a particular issue. A current example of such an issue is whether to move the Company's trading and hedging activities away from bilateral transactions to exchanges, such as the New York Mercantile Exchange (NYMEX). Such a move would shift the counterparty credit risk mentioned above from the Company to the exchanges, but would require that CECONY provide substantial amounts of collateral up-front based on expected trading levels. The committee formed a Risk Control Working Group, with representatives from various affected departments, to carry out a study of the changes and alternatives such as that described.

5. Electric Supply Procurement

Liberty's findings in this task are presented in four parts. Those parts are as follows:

- Electric Resource Dispatch
- Electric Scheduling
- Verification Processes
- CECONY Energy Supply Costs.

a. Electric Resource Dispatch

CECONY must consider its mix of purchase contracts, owned generation and NYISO purchases in determining how to meet its full-service load. Many contracted supply resources have restrictions on providing energy on a day-to-day basis. CECONY is required to take the electric output of several of its resources. Others have restrictions and limitations on the Company's

access to them. The various must-take provisions, restrictions and limitations must be taken into account in order to optimize their usage and to determine the amounts of ISO purchases required to meet the remaining daily load requirements. The result is a plan for scheduling power through the NYISO that we would describe as a rough manual dispatch process.

Several of the fixed contracts have must-take operational provisions, and are considered and scheduled first. The most important is the Entergy contract. [REDACTED]

The electric generation from CECONY's East River cogeneration/steam plants must be taken, as determined by the needs of the Company's steam system. The steam system has the first call on plant operational levels, and makes the operational decisions. The electric output is a by-product determined by the steam-requirements decision. East River units 1, 2, and 6 are must-take units, and unit seven must be taken in the summer. Electricity Supply coordinates with steam operations in scheduling East River into the NYISO.

The Brooklyn Naval Yard is a contracted steam/electric facility operated to support CECONY's steam system. Electricity from this unit must be taken at 220 MW in the summer.

Astoria energy is also a must-take contract for 16 hours on the five weekdays. Both the weekday off-peak hours and all weekend hours are optional for CECONY. Astoria is 500 MW combined cycle unit. The Astoria optional power can be compared to other options, with a minimum take of 240 MW.

The Linden complex includes six gas-fired combustion turbines in New Jersey, connected by a dedicated transmission line to CECONY. Five of the combustion turbines are allocated and contracted to CECONY. The Company contracts for both capacity and energy from the units. The Company can claim 645 MW of capacity to the NYISO. CECONY must take 300 MW of the energy output for 24 hours per day. In the range from 300 to 530 MW, CECONY may bid into the ISO day-ahead market for this energy. The output from 530 to 645 MW is a third option used for peaking power which may also be bid into the NYISO.

The Selkirk contract is a New York S-11 (PURPA) contract for a total of 265 MW located upstate. The units involved are the least expensive units that may be dispatched. The Company may request dispatch of the units with the limitation of 125 "turndowns" per year. The energy price is based on a three-day NYMEX natural gas average.

The Indeck contract is also an S-11 contract for 128 MW. It is relatively inexpensive on an energy price basis. However, once the unit is started up, it must run for 24 hours. The prices are based on a monthly market weighted cost of gas.

Buying from the PJM and ISO New England are also options, and CECONY was buying about 500 MW from PJM until a few years ago. However, the PJM pricing is less competitive, and

rarely utilized at this time. ISO New England energy pricing has not been competitive for CECONY.

CECONY buys the remainder of its full-service energy requirements from the NYISO in the day-ahead and real time markets. The NYISO energy purchases range from 300 to 400 MW during the lowest load hour in the winter to about 3,000 MW during peak summer hours.

b. Electric Scheduling

The electric scheduling department has routine daily processes that consider market conditions, resource availability and a limited amount of resource optionality prior to scheduling for electric deliveries. The following is a description of these daily processes, which result in schedules and bids at the NYISO to meet load requirements.

1. The first order of business is to review and finalize the reports from the previous scheduling day. These reports include the daily scheduling report, executive report and the daily price template.
2. Electric scheduling holds an all-hands planning meeting at 8 a.m. daily to discuss schedules, markets and issues. The first order of business is an update on electric loads, pricing and congestion. For instance, the peak load today (a Thursday) is expected to be about 8,200 MW total for the service territory; it is projected to be 7,900 on Sunday and in the 8,600 MW range next week. The load forecasting group provides the percentage of the total load that is CECONY full-service load.
3. Day-ahead market and real-time pricing for the local electric zones is provided for the previous day. For example, real-time pricing for New York City yesterday was \$75 per megawatt hour on-peak and \$63 off-peak. PJM pricing is also discussed.
4. A generation status update is provided. The status of CECONY's usual generating resources is noted, especially if there is a variance from the normal status. As an example, both units of Astoria energy (comprising 500 MW) are to be down and not available tomorrow (Friday). Other limitations and changes are also noted.
5. Transmission status is then discussed. For today, one of the three major transmission lines at Sprainbrook is down, reducing potential imports into the city by 700 MW. Other locational transmission outages are also noted.
6. Capacity availability through the NYISO is also noted and discussed; such capacity is seasonal.
7. Natural gas price status is provided for delivery at the city gate as well as the NYMEX Henry hub pricing.

The scheduling team then breaks up to prepare analysis on the limited resource optionality, which will be a determinant for scheduling and bidding. The scheduling for fixed resources is for two days ahead. The major steps taken to perform scheduling and NYISO bidding are as follows:

1. A scheduler at the day-ahead transaction desk routes energy from the generators to the CECONY busses. All purchases from scheduled resources must be routed; the energy to be routed today was scheduled yesterday in the two-day ahead bidding.

2. A scheduler analyzes the optionality of four or five key contracted plants on the margin in order to set the schedule. As noted previously, several of the contracted generators have must-take provisions. The next four contracted sources are where economic decisions are made for the fixed electric resources. The first economic option usually is Selkirk, followed by Indeck, Astoria and Linden. Contractual, operational and transmission limitations must be considered. The schedule is then drawn up for the most economic expected mix, or a rough scheduled dispatch.
3. The scheduler turns the preferred schedule over to the generator bidder. The work on the bidding starts at about 10 a.m. Bids are placed into the NYISO for the schedule of all contracted units and East River. A fuel price estimate is used to prepare the bids on a dollar per megawatt hour basis. The Henwood system trade manager module is used to identify, enter and send the bids to the NYISO.
4. A "load person" then determines the amount of energy required from the NYISO. In the example given, if CECONY's generator schedule calls for 3,500 MW and 4,000 to be needed, it will bid for 500 MW (in megawatt hours). The bids are for the day-ahead NYISO market. Six tiers of bids are prepared for each hour of the day, called price-cap load bids. For instance, they may bid for 50 MWH at no more than \$100, 50 MWH at no more than \$110, 75 MWH at no more than \$120, and so on for six tiers per hour. The day-ahead bids have a deadline to the NYISO of 5:00 AM, or 19 hours before the delivery day starts.
5. Real-time purchases make up for any shortfall to meet load requirements. The NYISO automatically covers any shortfall from the schedule and fills with real-time purchases as a type of balancing function. If the day-ahead bids are greater than the actual load for a particular hour, the NYISO will sell the excess in the real-time market. The pricing for the sale of such excess energy is usually lower than the bid price.

The functions described are rotated among employees on a weekly basis. The employees are cross trained for flexibility, except for the NUG contract analysis.

Departmental procedures include a two-day ahead bidding checklist. There is also an approval list (for the bidding checklist) for all areas affected. The generation desk has a procedural checklist that also has an approval list. The generation derate schedule is sent to the NYISO.

Electric resource planning performs a daily back-cast after the scheduling is completed. The electric resource group inputs actual weather and transmission constraints that occurred yesterday and performs a back-cast to check the performance of predictions and schedules. The scheduling and supply group reviews the back-cast and discusses the results.

c. Verification Processes

Energy management has a billing and analysis group whose responsibilities include the review and analysis of settlements and the validation of purchases for both physical energy purchases and hedging.

A key responsibility of this function is the checking and validation of NYISO billings. This function includes a manual check of the NYISO billing advisory on hourly and daily billings.

The ISO billing is performed by the hour; reports are available from the NYISO site. Information from the NYISO site is used to run an internal model that performs a billing verification. This model compares the Henwood system bids into the NYISO with actual charges from the NYISO. The totals from this verification model are then checked against daily summary reports of the ISO charges for energy, uplift, ancillary services, TUC, and transmission congestion. The totals of the daily volume summaries for the month are tested against the ISO monthly invoice.

CECONY notes that the focus of the NYISO billing verifications is on volumes, as pricing is difficult to validate on a daily basis. The Company and all other purchasers have to rely on the ISO for pricing information, which is not transparent on a daily basis. A NYISO audit committee has the responsibility to represent all of the purchasers and participants. The group manager also is a member of a user group of employees responsible for checking ISO bills at their companies.

A second area of checking and verification is on the billings from each of the bilateral purchase power contracts. The most important aspect is the verification of volumes taken. The hourly detail of volume deliveries from each supplier is checked by determining if the NYISO gave the supplier and CECONY credit for the full volumes that had been scheduled. Models are used to verify the bill volumes. The hourly volumes are totaled for the month and compared to the invoiced volumes for each supplier in their monthly invoices.

The Energy Supply and Scheduling group supplies the pricing mechanism for each NUG contract. The Billing and Analysis group then maintains a separate spreadsheet for each purchase contract to keep track of the varying pricing mechanisms for comparison with invoices. The contract fuel prices are also checked against market prices from third-party information sources.

CECONY generates a sample invoice for each supplier to check information gathered against the actual supplier invoice. The supplier is called to check and discuss the invoice and verify the volumes and pricing estimated by the Company. The supplier then sends the actual invoice after agreement is reached. Any remaining differences and true-ups are negotiated and settled at the end of each year.

For financial hedging contracts, the analysis group looks strictly at the contract settlement. The trades, when executed, go into the Allegro system. Information on transactions comes from an Allegro confirmation report, which confirms the trade. The Allegro confirmation report is reconciled to invoices from the hedging counterparties.

The procedures followed by Billing and Analysis are general accounting procedures spelled out in GAP 205-A and as outlined in a SOX matrix. The department does not have specific written procedures for checking invoices.

d. CECONY Energy Supply Costs

The following tables provide the CECONY costs of procuring electric energy for 2005 through November 2008.

2005 CECONY Electric Energy Supply

	MWh Purchased	Energy Charges	\$/MWh Energy Only
Entergy (includes Gilboa energy)	8,332,265	\$356.1MM	\$42.79
NUG Generators	9,005,356	\$789.3MM	\$87.65
NYISO Spot Purchases	11,430,202	\$1,221.0MM	\$106.82
Other	297,579	\$16.2 MM	\$54.44
<i>Total Purchases</i>	<i>29,055,402</i>	<i>\$2,382.7MM</i>	<i>\$82.00</i>
East River, other CECONY	2,257,292	\$263.0MM	\$116.51
Total Electric Resources	31,312,694	\$2,645.7 MM	\$84.49

2006 CECONY Electric Energy Supply

	MWh Purchased	Energy Charges	\$/MWh Energy Only
Entergy (includes Gilboa energy)	8,341,569	\$383.7MM	\$46.00
NUG Generators + Astoria	10,033,803	\$809.2MM	\$80.64
NYISO Spot Purchases	6,708,842	\$564.0MM	\$84.07
Other	198,003	\$16.1MM	\$81.46
<i>Total Purchases</i>	<i>25,282,217</i>	<i>\$1,773.1MM</i>	<i>\$70.13</i>
East River	2,781,565	\$308.8MM	\$111.02
Total Electric Resources	28,063,782	\$2,081.9 MM	\$74.18

2007 CECONY Electric Energy Supply

	MWh Purchased	Energy Charges	\$/MWh Energy Only
Entergy and Astoria	10,641,211	\$684.3MM	\$64.31
NUG Generators	8,296,584	\$664.7MM	\$80.11
NYISO Spot Purchases	5,611,731	\$496.1MM	\$88.41
Other	169,862	\$10.8MM	\$64.29
<i>Total Purchases</i>	<i>24,719,388</i>	<i>\$1,855.8MM</i>	<i>\$75.08</i>
East River	2,885,894	\$320.1MM	\$110.91
Total Electric Resources	27,605,282	\$2,175.9MM	\$78.82

2008 CECONY Electric Energy Supply

	MWh Purchased	Energy Charges	\$/MWh Energy Only
Entergy and Astoria	10,260,274	\$743.7MM	\$72.49
NUG Generators	8,517,513	\$846.1MM	\$99.34
NYISO Spot Purchases	4,938,391	\$587.6MM	\$118.98
Other	148,634	\$12.6MM	\$84.76
<i>Total Purchases</i>	<i>23,864,812</i>	<i>\$2,190.0MM</i>	<i>\$91.77</i>
East River	2,854,807	\$374.8MM	\$131.28
Total Electric Resources	26,719,619	\$2,564.8MM	\$95.99

C. Conclusions

1. Organization and staffing are commensurate with that of effectively managed electric supply procurement groups, although manager turnover has been high.

Energy Management is organized in a manner that is commensurate with the effective planning, analysis, and procurement of electric capacity and energy. Key managers' experience levels are consistent with those generally found in the industry in similar positions. Staffing levels are appropriate, and individual staff members are generally well qualified.

The Electricity Supply department has, however, experienced significant turnover in the past 12 months. The department director left the Company, and has been replaced with an experienced manager from within CECONY. The Electricity Hedging section manager left the Company recently, and has not yet been replaced. The hedging function is temporarily being managed by the new supply director, with help from the group's experienced senior analyst. The section manager of electricity supply and scheduling took early retirement in 2008, and was replaced by a senior employee from that group.

While the recent manager turnover in electric supply has left the department somewhat thin in supervisors, the successors and experienced staff employees have been able to compensate until all of the positions are filled and more experience gained.

2. Opportunities to consolidate the electric and gas financial hedging activities have not been realized. *(Recommendation 1)*

The formation of Energy Management several years ago brought the procurement functions for electricity and natural gas under the same management, and the commodity functions share a common physical work area. Electricity supply and gas supply each have a section whose function is to purchase hedges for the respective commodity. Both hedging groups plan for and purchase financial hedges for their commodity. Gas hedges are utilized for hedging both the electric and gas commodities, as the gas hedges are effective in moderating electric price volatility because of the high correlation that electric and gas prices showed.

The processes of planning for and purchasing of gas financial hedges is currently being duplicated in electricity supply and gas supply. The Energy Management vice president acknowledged that there is no current reason why the execution of gas hedging should not be performed as one function for both commodities.

3. CECONY does not have a comprehensive and structured approach with clear goals and objectives for electricity-supply "portfolio design." *(Recommendation 2)*

Liberty asked several times, in data requests and in interviews, for a CECONY portfolio design and optimized plan for the electric resources required to serve its full-service customers over the long term. The Company does not have such a comprehensive plan in place, and it has not performed documented analysis of an optimized resource portfolio that would most effectively meet these requirements. A long-term portfolio design and plan determines the general types of supply resources and mix of such resources that will be most effective given forecasted energy markets. Setting specific long-term objectives lays the cornerstone for portfolio design and

effective management of energy procurement. Without first specifying objectives to offer guidance and limits, a company is much less likely to design and manage a portfolio effectively. An example of such a long-term electric procurement objective would be to reduce above-market electric supply costs by 50 percent over 5 years.

Companies should next design long-term portfolio plans, and support them with sound operations and with effective physical and financial transactions. The portfolio plan determines the resource requirement levels required (incorporating DSM), and the types of supply resources and mix of resources that will be most effective given forecasted energy markets. Note that long-term portfolio planning does not include actually contracting for resources for the plan horizon; such longer-term electric and hedging contracts are not available or advisable for the entire long-term planning period.

The actual execution and management of the plan, including the signing of supply contracts, will occur opportunistically, and deviate from the generalized design plan as necessary.

The Company has explained that inheriting the NUG contracts in the restructuring process caused much of its current portfolio to already be in place. The addition of the Entergy and Astoria purchase contracts provided a large portion of the remaining capacity and energy requirements.

CECONY clearly has more limited options for electric supply procurement than most other utilities; nevertheless, the Company should be constantly planning and analyzing its future mix of resources for both capacity and energy. The lack of a portfolio design, long-term goals and objectives and a recurring process for analyzing and planning for an optimized portfolio results in the company not fully evaluating all of the alternatives available in a constantly changing marketplace. CECONY should also have an optimized long-term portfolio plan to present to and discuss with the public service commission; currently, only the hedging plan for electric supply is presented.

Portfolio management includes the described development of a long-term electric resource design and plan, the eventual procurement of the required resources, and the management, including hedging, of the resources on an ongoing basis. The total process of portfolio management provides utilities and regulators with a commonly understood and systematic process for identifying and managing electric resources.

4. The performance measurements for energy management provide incentives for only a portion of appropriate electric supply goals and objectives. (Recommendation 3)

The key performance indicators (KPIs) for the vice president of Energy Management and the Electricity Supply director do not provide measures and incentives that are aligned with quantified goals and objectives. The Electric Supply director has the following three quantified performance goals:

- Manage the volatility of CECONY energy supply costs (less than 10 percent)
- Effectively manage Linden contract dispatch (less than Zone J market prices)
- Effectively manage Astoria off-peak dispatch (beat Zone J pricing 85 percent of the time).

The vice president of Energy Management has the following performance indicator for electric and gas volatility: manage the volatility of energy supply costs (volatility for gas and electric of less than 13 percent)

The quantified KPIs are not aligned with quantified goals and objectives for energy management. In addition, the KPIs for volatility are extremely easy to meet. For instance, the volatility incentive for electric energy of less than 10 percent is less of a goal than a given, as hedged volatility has historically not exceeded 10 percent.

As noted in Conclusion 3 above, quantified goals and objectives do not currently exist for Electricity Procurement. The quantification of such goals and objectives, as suggested in Recommendation 2, would allow the design of KPIs to align with performance against overall goals and objectives.

5. Portfolio design for CECONY electric supply has limitations related to legacy NUG contracts and unique geographical issues that inhibit price effectiveness.

The NUG contracts have been an impediment to CECONY's acquisition of more effective sources of capacity and energy for full-service customers. The legacy contracts assigned to the Company in electric restructuring produce significant above-market costs. The contracts include capacity prices that are significantly higher than market prices available to the Company. The presence of these contracts is a key reason that CECONY's electric capacity procurement costs are higher than may be acquired in the spot market. For instance, capacity from the NUG contracts average \$14.51 per kilowatt-month in 2008, compared to only \$3.98 for market capacity purchases from the NYISO. [REDACTED]

[REDACTED] The NUG contracts provided about 25 percent of the total capacity required, but accounted for 57 percent of the capacity costs of purchased power. Some of the NUG contracts have more competitive energy charges, and are regularly dispatched by the Company.

Geographical location, transmission constraints, and locational voltage support issues also place well-known constraints on CECONY's electric supply resource options. Bi-lateral contracts for capacity were also not allowed in New York City prior to 2007. These restrictions eliminate consideration of many electric resource options available to other utilities in the state or region, and they increase the net cost of electricity to CECONY due to periodic local market under-supply and the costs of transmission congestion and ancillary services required.

6. CECONY electric procurement has incorporated appropriate supply flexibility to respond to customer migration, DSM and other loss of load through 2012.

Retail choice and, to a lesser extent, DSM have steadily reduced CECONY's full-service electric load over the past several years. These reductions are expected to continue or accelerate in the future, as the usage upper limit for full-service customers is reduced to the 500 kilowatt level. CECONY has recently adjusted its load duration forecasts and Entergy supply contract to account for these effects.

A CECONY supply contract option from Entergy had to be exercised by October 1, 2008. The Company's refined analysis of the 2010-2012 period led it to conclude that the full exercise of

the contract would likely result in an over-supply situation, with fixed contracts for electric supply exceeding load requirements, especially in off-peak hours. The Company exercised the option for only 200 MW (rather than 350 MW) for 2010, and did not exercise the options for 2011 and 2012. [REDACTED]

For the period through 2012, the volumes of fixed electric supply are well-matched to the expected load. CECONY's Entergy contract volumes have been adjusted to avoid a potential resource over-supply during this period.

7. CECONY's planning for electric supply procurement is not sufficiently long term to capture the load requirements and resources past 2012. (Recommendation 2)

CECONY does not extend its electric resource planning beyond 2012, which Liberty considers too limited a time horizon to optimize planning for the future. The Company prepares peak load requirements forecasts for 10 years; however, electric resource plans have not been analyzed or prepared for the 2013-2018 period.

Liberty asked the company why supply planning is not longer-term in nature. CECONY believes that a high degree of uncertainty exists in the full-service load forecasts. The usage cut-off for full-service customers is being reduced from 1,500 kilowatts to 1,000 kilowatts to 500 kilowatts, which will reduce load significantly. A high degree of uncertainty related to the future impact of DSM was also emphasized by the Company. The first termination of a NUG contract will occur in 2014. The Company also notes that electric supply contracts longer than three years are not available in the market.

The difficulty of forecasting load requirements and not knowing the exact electric resources available in the future are not good reasons to avoid long-term planning, but in fact underscore the importance of examining future uncertainties and responsive actions carefully. A portfolio plan provides a long-term roadmap to determine where the company's electric procurement is going regarding resource requirements and future alternatives for meeting them. The portfolio plan determines the resource requirement levels required (incorporating DSM), and the types of supply resources and mix of resources that will be most effective given forecasted energy markets. Analyzing various resource mixes under changing load and market conditions will stimulate thought regarding how to make progress toward long-term objectives. Note that long-term portfolio planning does not include actually contracting for resources for the plan horizon; electric and hedging contracts that cover the entire planning period are not available or even advisable. The execution of the plan should occur opportunistically, and deviate from the generalized plan as necessary with the evolution of requirements and markets.

8. Efforts to identify alternative sources of capacity and energy have not been fully analyzed or documented. (Recommendation 4)

CECONY did not analyze and document evaluations of market alternatives for electric capacity and energy supplies for several years. The 2002/2003 RFP process that resulted in the Astoria Energy contract was an in-depth test and analysis of the supply alternatives available at that time.

However, CECONY did not respond to several Liberty requests with any substantial documented evaluations conducted since that time.

The Entergy contract extension options have been analyzed annually and presented to the Finance Committee of the Board of Trustees. These annual analyses have compared the contract extensions to only the alternative of purchases from the NYISO. Other market alternatives were not identified and evaluated. The Company believes that large open solicitations such as an RFP process will cause the electric supply prices to CECONY to rise in response to such an acknowledgement of “need”. In addition, bi-lateral capacity contracts were not allowed in New York City prior to 2007 to reduce the market power of merchant generators.

In 2008, CECONY considered the additional supply alternative mechanisms of an electronic financial auction to purchase NYISO physical energy and an auction for physical supply sources to be secured in bi-lateral transactions. The abbreviated evaluations of these alternatives, while not fully documented, are the types of market alternatives that the Company was apparently not considering from 2003-2007.

9. CECONY’s examination of new capacity resources and markets to meet its NYISO ICAP requirements has not been sufficiently aggressive. (Recommendation 4)

The NYISO’s requirement that CECONY have in-city capacity for 80 percent of its load requirements is partially met with NUG contracts, the Entergy and Astoria contracts, and East River capacity. The Company buys all of the additional capacity required to meet its locational capacity requirements by participating in the NYISO’s installed capacity (ICAP) auctions. CECONY does not have documented evaluations of having explored alternatives to these sources.

The Company has noted that a capacity surplus of about 1,000 MW currently exists in the city, which is expected to grow with a second Astoria plant being built. The surplus has driven down capacity prices in New York City.

Prior to 2007, New York City merchant generators were prohibited from selling their in-city capacity in bi-lateral contracts on a long-term basis to reduce their market power. This ban has been lifted. In addition, while in-city generators must first offer their capacity to the NYISO, capacity contracts directly with in-city generators may be available. Informal markets for capacity purchases also exist through brokers and direct purchases from generators. Finally, the NYISO is considering the development of a forward market for capacity purchases for up to three years in advance.

Market alternatives to the NYISO capacity auctions exist in the marketplace. CECONY should evaluate all feasible alternatives to its existing sources for capacity purchases, and include them in its plan for optimal portfolio management.

10. The cost of the East River electric resource is much higher than available market alternatives.

The following table provides an estimate of the East River station complex capacity costs for 2005-2008 based on unit electric capability of 716 MW, as provided by CECONY.

East River Capacity Costs

	2005	2006	2007	2008
East River Capacity Cost	\$31.39	\$28.99	\$28.91	\$30.33
NYISO Capacity Cost	\$6.71	\$6.36	\$6.76	\$3.98
East River Capacity Premium per kw month	\$24.68	\$22.63	\$22.15	\$26.35
East River MW Month Capacity	8,592	8,592	8,592	8,592
East River Above-market Capacity Costs	\$212.1MM	\$194.4MM	\$190.3MM	\$226.4MM

East River Energy Costs

	2005	2006	2007	2008
East River Energy Cost per MWH	\$116.51	\$111.02	\$110.91	\$131.30
NYISO Energy Cost	\$106.82	\$84.07	\$88.41	\$118.98
East River Energy Premium	\$9.69	\$26.95	\$22.50	\$12.32
East River MWH	2,087,967	2,781,565	2,885,894	2,854,807
Above-Market Energy Costs	\$20.2MM	\$75.0MM	\$64.9MM	\$35.2MM

11. CECONY has not recently explored economically buying out its high-priced NUG contracts. (Recommendation 4)

Most of the NUG purchased power contracts that were entered into by the Company prior to electric restructuring are expensive when compared to market (Liberty estimates that NUG contracts had capacity payments that were \$245 million above market in 2008). Entering into these legacy contracts was required by the national or state requirements; the relevant question now is whether there may be market options for economically buying out the contracts. Liberty did not find any analysis or documentation that CECONY has investigated negotiating economic buyouts of these contracts in the last several years.

According to the Company, the Sithe contract was renegotiated twice, the last time several years ago. Discussions also took place with regard to the Linden contract more than five years ago and with regard to the Indeck and Selkirk contracts in 2006 and 2007, respectively. However, CECONY has not considered or analyzed the potential economic buyout of the contracts over the past few years.

A number of high-priced NUG contract buyouts have been negotiated throughout the country in past years, resulting in lower electric costs for customers. Decreasing capacity prices for New York City may provide increased opportunity to economically buy out contracts. The buy-out of NUG contracts may be structured to replace the contract capacity with less expensive bi-lateral capacity contracts, or with market options that could require hedging to reduce inherent market risks. Simply stated, the company should explore alternatives in the marketplace to take advantage of opportunities to reduce the above-market costs of the NUG contracts. The reduction of above-market costs should be a key objective of resource planning and portfolio design.

The economic buyout of a power contract could also result in substantial up-front payments to the generator. Giving CECONY stronger incentive for pursuing potentially beneficial arrangements for customers makes relevant a discussion with the NYPSC about recovery methods for any such payments.

12. CECONY risk management operates pursuant to a comprehensive program with established and enforced policies and procedures and appropriate senior management oversight.

The Company has a well-defined energy risk-management structure, with an executive-level Risk Oversight Committee, a Regulated Risk Management Committee and appropriate risk policies in place. Everyday management is performed by an Energy Risk Management group whose job is to enforce risk-management policies and procedures. In response to a recommendation by the external auditors, the ERM group reports to a different vice president from the one who is responsible for the risk-management activities.

The ERM group was formed in 2001; its first task was to develop the policies and procedures which it now administers. Few violations of those policies and procedures have occurred. When they do, the violations are typically about a credit limit being temporarily exceeded. Such violations have been properly reported to the Regulated Risk Management Committee, along with a report on the actions taken in response to the violation.

13. Credit qualification and management for CECONY counterparties is properly structured and effectively operated for the Company's trading activities.

The Company has established a list of approved counterparties for financial hedging transactions. Each has assigned credit limits based on credit ratings. Some of the counterparties are financial institutions that have recently experienced weakened financial status due to widespread financial market issues; CECONY has monitored their status fairly closely. The Company temporarily stopped trading with one counterparty that did not produce the collateral posting required on a timely basis.

CECONY has effectively managed its existing counterparties and the extension of credit with the strongest trading entities that have been available. Due to the weakening of counterparty financial status, a working group of the RRMCM is evaluating trading through market exchanges such as the NYMEX to reduce counterparty risk. Liberty considers this evaluation to be appropriate and timely.

14. CECONY's price risk management (hedging) program is consistent with NYPSC requirements for reducing price volatility. (Recommendation 2)

The Commission has examined hedging in conjunction with the state's utilities in proceedings extending from 2004 through 2008. The Commission has shown a clear desire to protect mass-market customers from high levels of volatility. The Commission has not been prescriptive in requiring specific types of hedging approaches and portfolios. CECONY's programmatic approach to hedging with a 36-month plan horizon has reduced electric price volatility, as historically measured by the Company with the coefficient of variation. Its approach effectively "smoothes" the general level of the electric prices in the marketplace to dampen price spikes. This approach is a simple and easily understood method to generally reducing price volatility, as desired by the commission.

The Commission has also recently decided that volatility for mass-market customers should be measured and reported quarterly using both standard deviation and coefficient of variation. The Company has implemented and filed quarterly reports that meet requirements.

Hedging goals and the annual hedging plan should also be an integral component of the optimum portfolio management for the Company, as noted in Conclusion 3. Portfolio management should strive to determine the overall mix of supply portfolio sources and financial hedging that together form the most effective total plan.

15. Electric hedging is effectively guided by a Board of Trustees-approved hedge plan and operational policies and procedures.

CECONY performs extensive analysis to determine an optimal hedging plan based on the general objective of reducing full-service customer price volatility. The Company analyzes varying levels of financial hedges and the types of hedging approaches available, such as monthly procurements versus purchasing calendar scripts. The results of the hedging analyses are presented to senior executives along with recommendations for a hedging action plan. The action plan specifies the percentage of NYISO and NUG electric purchases to be hedged, and specifies a 36-month horizon for buying the hedges.

A specific hedging plan is then recommended to the finance committee of the Board of Trustees. The hedging plan is very specific regarding volumes, acceptable hedging instruments, and specific timetable for purchases. The hedging purchases are scheduled to be purchased in generally level amounts over a 36-month horizon. The Company's analysis of natural gas markets since 1990 indicates that natural gas pricing follows a pricing cycle of approximately 3 years from peak to trough; the three years hedging horizon is built around this house. The Electricity Hedging group then executes the approved plan in accordance with specific procedures and guidelines outlined in a hedging manual. Liberty found the Company's annual hedge plan to be clearly planned and executed.

16. CECONY uses the liquid and transparent NYISO markets for incremental electric procurement.

CECONY uses the NYISO for much of its electric supply procurement, which is the most liquid and transparent market available. All energy purchases, whether from bi-lateral contracts, East River, or spot purchases are all scheduled through the NYISO. Adequate capacity for NYISO locational requirements must also be arranged. This makes essentially all of the supply purchases transparent through access to NYISO information and reports.

As noted previously, the Company has a number of NUG contracts as well as purchases from Entergy and Astoria; they make up about one-half of the capacity purchases and the incremental spot energy purchases. These incremental purchases of NYISO capacity and energy increase the transparency and liquidity of the range of transactions.

For the Company's hedging activities, the principal instruments utilized are futures and options. Futures contracts are traded on the NYMEX, making prices and liquidity apparent. Some options are also bought on the NYMEX, but others are bought in bilateral transactions. When that

occurs, the Company is usually buying a “NYMEX look-alike,” so that its price and trading volume are readily available by checking the NYMEX.

17. CECONY Internal Auditing has not tested the electric procurement decisions and decision-making processes with sufficient frequency. (Recommendation 5)

CECONY internal audits of the electric procurement functions have been limited to examining the approval of purchase orders in accordance with the Delegation of Authorities, the risk management and back office functions that monitor and check transactions for pricing and volumes, and test the accuracy of invoices. Internal Auditing reviewed the most recent long-term firm power contract in 2008, but has not audited the decisions that are made on a daily basis by electric supply that determine which energy sources are used, the volumes of purchases, daily energy price bidding to the NYISO, and other supply decision processes. Liberty did not find any audits of these latter activities from 2005 to present.

The electric procurement decisions result in energy costs that are passed to customers of over \$3.5 billion annually, which represents the largest CECONY expenditure area. The decisions made in signing electric bilateral contracts, the daily dispatch and scheduling of contracted power, buying capacity contracts, and making spot purchases are a crucial and inherently risky process. These decision processes require regular auditing and vigilance, as they constitute one of the greatest areas of risk. Liberty believes that this function requires frequent and regular audits, in order to assure compliance with procedures and to look for any errors or malfeasance.

18. Daily electric scheduling and bidding operations are effectively conducted with appropriate approval processes.

CECONY has well-defined daily processes and operations for scheduling electric purchases and for bidding for NYISO spot electricity. These everyday activities have been structured and refined over several years so that their timing is routine and effective.

The Company has had problems in the past with its bidding processes. Approximately two years ago, the spot energy bid was not made to the ISO. A second problem was experienced with the analysis of transmission congestion bidding. The Company investigated the issues, terminated the employee responsible for both problems, and established additional checking and backup processes for bidding as corrective actions. The Company's current operations reflect the improved processes and reviews.

19. CECONY has significantly reduced its purchases of higher-priced NYISO spot energy over the last several years.

Purchasing spot energy in the day-ahead and real-time markets tends to be the most expensive incremental source of electric energy. At one point several years ago, spot energy purchases represented more than 60 percent of total company purchases. While buying mostly from the spot market may minimize the regulatory risk associated with potential over-supply situations associated with fixed electric contracts, it will result in higher costs than a more balanced approach.

In 2008, spot energy purchases represented about 20 percent of the purchased power total. By contracting for generally less expensive power from Astoria and Entergy and by dispatching the lower-cost NUG contracts, the Company has reduced spot purchases to a more cost-effective level. By lowering the percentage of spot purchases, CECONY has lowered electric procurement costs to the Company and its customers.

20. Electric procurement operations do not have comprehensive and clearly documented policies and procedures. (Recommendation 6)

Electricity Supply and Scheduling does not have documented processes and procedures in place for its daily operations of purchasing and scheduling electricity. The department has a daily operational routine that it follows for purchases and scheduling that is effective. However, CECONY does not have documented procedures, processes, controls and limitations in place, other than check lists for ISO bidding and the generation desk. Documentation of these important processes would provide a reference manual for employees, which is especially important if there is turnover in the department. Detailed guidelines, controls and procedures must also be documented so that the processes may be audited by the internal auditors.

Appropriate documentation of the processes, procedures and policies should be in place for this complex and important operation. The Electricity Hedging group has a detail procedural manual, for instance. Similar documentation should be in place for the procurement operations.

The second area that requires controls, guidelines and procedures is where hedge purchases are allowed to deviate from the approved hedge plan by up to 20 percent. The flexibility in the volume for hedge purchases is intended to allow purchases of calendar strips for hedging, and not to make discretionary hedging purchase decisions. Such discretionary decisions would generally require the approval of the vice president. However, there are not documented guidelines, procedures and limits that specifically define appropriate actions in this particular area.

21. CECONY effectively analyzes NYISO and regional electric market activities and changes, and provides its input to appropriate forums and committees.

The Energy Markets Policy group within Energy Management is responsible for monitoring regulatory developments and taking positions on issues related to the wholesale energy markets. They work in conjunction with the NYISO in modeling the regional electric system. They have input to the annual resource planning over a 10-year forward horizon, known as the NYISO comprehensive reliability planning process. Energy Management also participates in numerous committees at the NYISO.

Energy Management also maintains in-house models to provide their own access to regional reliability and market area production costing information. They perform market analyses that are used to provide information for the development of corporate energy policies, such as new proposed generation and transmission projects in the region and estimating their effect on regional energy pricing. These analyses are performed to determine if CECONY should support or oppose such projects at the NYISO or the NYPSC.

D. Recommendations

1. Consolidate duplicative Energy Management operations in the electric and gas hedging functions. (Conclusion 2)

The processes of planning for and purchasing of gas financial hedges is currently being duplicated in electric supply and gas supply. The Energy Management vice president has acknowledged that there is no current reason why the execution of gas hedging should not be performed as one function for both commodities. The duplicated functions should be consolidated as soon as possible.

2. Develop a comprehensive portfolio management plan with quantified goals and objectives to optimize the electric resource portfolio and related hedging plans. (Conclusions 3, 7, 14)

CECONY should develop a plan for electric portfolio management that considers the electric resource options available as well as a financial hedging component as one package. The entire portfolio management for electric procurement should be optimized as one package, with the most effective mix of electric resources and overlaid financial hedging. Most importantly, the plan should include quantified overall goals and objectives for total portfolio management.

Optimized portfolio management includes the development of a long-term electric resource plan, the procurement of the resources identified in that plan, and the management, including hedging, of the resources on an ongoing basis. The establishment of quantified goals and objectives for electric procurement provides an all-important foundation and targets around which a plan can be designed.

For instance, CECONY pays above-market capacity charges that Liberty has estimated in comparison with the NYISO capacity charges that the company has paid. For 2008, CECONY paid an estimated \$245 million in above-market capacity costs on NUG contracts alone. The company paid another \$226 million of above-market costs on capacity charges from East River. Long-term goals should be set to reduce the above-market capacity costs by significant amounts, such as 25 percent in 3 years, 50 percent in 5 years and 75 percent in 10 years. (These percentages are arbitrary and not based on any specific analysis). Capacity price effectiveness would entail specific, measured progress toward such long-term goals on an annual basis. The long-term goals should be set by the company and include linkage to long-term energy procurement plans, financial forecasts, budgets and management performance indicators for energy management.

The types of quantified goals and objectives for electric procurement should include, but not be limited to, the following:

- Price volatility (Con Edison currently has an implied but unstated price volatility goal of 10 percent co-variation)
- Capacity price effectiveness (Significant reductions in above-market capacity prices toward NYISO market prices)

- Electric energy price effectiveness (The consolidated Entergy, Astoria, NUG generator, new resource and East River energy prices should beat the NYISO market price by specified challenge percentages over annual and multi-year time horizons)
- Cost performance of dispatched resources versus market prices (Make current energy management KPI goals referenced in conclusion #4 into more stringent overall goals)
- Cost performance of NYISO spot bidding versus alternatives. (Make current energy management KPI goals referenced in conclusion #4 into more stringent overall goals)

CECONY's electric hedging program should be designed and analyzed in conjunction with the electric resources to determine the optimum total portfolio. Price volatility should be targeted within an acceptable range that is consistent with NYPSC requirements. The Company should design hedging strategies as part of the analysis of alternatives in designing an optimal portfolio. These strategies should be tested under a wide range of potential market conditions to ensure acceptable results in volatile markets.

An optimized portfolio management plan should also include a longer planning horizon than CECONY currently considers. The Company does not extend its electric resource planning beyond 2012. Liberty believes that an optimized portfolio management plan should include 10 years of resource plans to match CECONY load forecasts and to provide a consistent long-term planning horizon for electric resources. The long-term resource plan provides the structure and resource components on a conceptual basis; the actual acquisition of resources should be opportunistic over time as markets change and evolve.

An optimized portfolio management plan would provide the Company and the NYPSC with a commonly understood and systematic process for identifying and managing electric supply resources.

3. Revise the performance measures (KPIs) for energy management to provide metrics and incentives that align with electric procurement objectives. (Conclusion 4)

CECONY should revise its KPIs for energy management to include performance incentives that are aligned with procurement goals and objectives. In Recommendation 2, Liberty has suggested that the Company develop quantified goals and objectives in the electric procurement as part of portfolio management planning. These high-level goals and objectives should be used to design performance incentives for energy management and electric supply. The incentives should include performance on goals and objectives such as those previously defined: price volatility and levels; capacity price effectiveness; energy price effectiveness; dispatched unit performance; and spot market bidding performance. The KPIs should provide incentives for performance that exceeds reasonable goals set on moderate levels of performance.

4. Identify, analyze and document all reasonable alternatives to its existing sources for both capacity and energy. Alternatives that are superior to the status quo electric resources should be implemented. (Conclusions 8, 9, 11)

CECONY should consistently evaluate all reasonable alternatives in the marketplace for the acquisition of capacity and energy. The Company has not regularly performed robust analysis of available alternatives over the last several years. However, in 2008, CECONY considered the

additional supply alternatives of an electronic financial auction to purchase NYISO physical energy and an auction for physical supply sources. The Company should expand its evaluations of supply alternatives in the future.

Electricity Supply should expand its thinking about acceptable alternatives for meeting NYC ICAP capacity requirements beyond its almost exclusive use of NYISO purchases. Given the oversupply of in-city generating capacity, there is no reason, in our view, to not intensely explore all options to buying capacity from the NYISO. Market alternatives to the NYISO capacity auctions exist in the marketplace. CECONY should evaluate all feasible alternatives to its existing sources for capacity purchases, and implement new sources when they are superior.

Finally, CECONY should explore creative electric supply activities such as NUG contract buyouts to determine if they may result in lower electric costs for customers. CECONY should evaluate alternatives and implement favorable options. The economic buyout of NUG contracts must result in lower net energy prices for customers, as well as ensure that the Company receives appropriate recovery of all costs involved.

5. Internal Auditing should schedule more frequent audits of electric procurement decisions, documentation for entering into electric supply contracts, and daily purchase decisions. (Conclusion 17)

Internal Auditing should audit the electric procurement decisions made by electric supply on a regular basis. Electric procurement decisions result in energy costs that are passed to customers of about \$3.5 billion annually, which represents the largest expenditure area for the Company and a large operational risk area. Decisions made on rare occasions to obtain a large fixed electric supply resource, which should be examined by internal audits. Decisions to buy capacity contracts from the NYISO auctions and other sources should also be examined.

Other electric procurement decisions that should be audited occur on a daily basis. The daily dispatch and scheduling of contracted resources and making spot capacity and energy purchases are crucial and inherently risky processes. These daily decision processes require regular auditing and vigilance, as they constitute one of the greatest areas of risk to the Company.

Liberty believes that this function requires frequent and regular audits, in order to assure the most attractive electric sourcing and to look for any errors or malfeasance. Liberty was quite surprised to see that this is not frequently and routinely done. It must be to assure that supply awards are being made to minimize the cost of electricity to the Company and its customers.

6. Document processes, procedures, and guidelines for electric supply and scheduling, and for the 20 percent purchase flexibility in electric hedging. (Conclusion 20)

CECONY should immediately document the important procurement procedures in a manual that may be used by both employees and by auditors. The dollar volume and importance of the electric procurement processes requires detailed documentation, reviews, and controls.

The Company should also expand its hedging manual to include guidelines, procedures and limits for the 20 percent range of allowed flexibility above and below hedge plan purchases.

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XVII. Supply Procurement – Gas

CECONY's gas supply function is well organized, and is staffed with well-qualified, capable people. Liberty is concerned, however, that Gas Supply has not explored some potential alternatives in its capacity planning. Liberty recommends that the Company look more broadly in this area before making additional commitments to gas-supply capacity projects.

Liberty also found a gap that affects capacity management. Gas Supply has not used its organizational connection to Electricity Supply to explore subjects of mutual interest. Also, returns from secondary-market activities are comparatively very low. Liberty presents recommendations in both of these areas.

A. Background

Gas utility companies buy both the commodity (natural gas) that they supply to their customers, and the storage and delivery capacity to bring the gas from points where they purchase it to points of entry into the gas distribution system (gate stations, or "city gates"). Gas utilities in New York buy commodity for customers connected to their distribution systems, but who do not choose a third-party supplier (TPS). These customers are known as full-service, or "default" customers. New York utilities buy capacity both for their default customers and for customers supplied by TPSs.

The CECONY Gas Supply department buys commodity for its own full-service customers, and also for those of affiliate Orange & Rockland. Gas Supply also buys gas for the Company's Steam Business Unit (SBU). Gas Supply buys capacity for those three groups, plus most of the customers of other suppliers who are active on CECONY's distribution system. Gas Supply also buys capacity that it uses to provide load-following and balancing services to the TPSs, and to other large-volume gas users connected to its distribution system.

Gas commodity and capacity must be managed in a manner that keeps customers supplied at reasonable costs and that uses available resources in the most cost-effective manner. Capacity resources required by CECONY to maintain the desired level of reliability to its customers have value in secondary markets during the times when CECONY is not using them to serve those customers. Part of the job of each gas distributor's gas-supply function is to market those available but unused resources in a manner that maximizes returns to the customers who are ultimately responsible for their costs.

Liberty examined CECONY's conduct of these functions in five tasks. Those five tasks were as follows:

1. Organization, Staffing and Controls
2. Supply Capacity Planning
3. Commodity Procurement
4. Capacity Management
5. Measurement and Balancing.

The criteria by which Liberty evaluated supply procurement - gas included the following:

- Organization, staffing and controls

1. Organization and staffing should be commensurate with the mission, goals and objectives of gas-supply procurement groups.
2. There should be adequate coordination with other corporate departments involved in or supporting gas procurement activities, particularly those responsible for electricity procurement.
3. Key managers' experience levels should be consistent with those generally found in the industry in similar positions.
4. Approval processes should be consistent with the magnitude and risk of commitments involved, and with processes applicable to other major corporate commitments.
5. Gas procurement policies and procedures should be consistent with work requirements and gas procurement and marketing objectives.
6. Internal measurement systems should address performance quality on a comprehensive, ongoing basis.
7. There should exist well-defined document creation and maintenance objectives and requirements.
8. Documentation of procurement actions should be adequate to support regulatory oversight and review.
9. Financial audits should be conducted routinely, to check for errors and assess compliance with procedures.
10. Management/performance audits should be conducted occasionally, to ensure that procurement and contracting practices reflect industry "best practices".
- Supply capacity planning
 11. Requirements forecasting should address the entire load duration curve, in order that capacity planners can adjust the capacity portfolio to fit the load.
 12. The time frames for requirements forecasting must accommodate the lead times necessary to change the capacity portfolio.
 13. Supply capacity planning must accommodate the legitimate needs of third-party suppliers, as those needs are specified or supported by appropriate regulatory authorities.
 14. Capacity planners should be aware of potential new markets within the company's and have at least a general sense of the company's ability to accommodate them.
 15. Planning must be supported by adequate analytical capability, which generally includes resource optimization software.
 16. Analysis generally focuses on identifying that combination of resources that serves present and anticipated loads at the lowest possible cost.
 17. There should exist appropriate efforts to identify alternative sources of supply.
 18. The development and evaluation process should take place pursuant to identified needs. Such needs could include an inferior resource that the company wants to replace.
 19. There should be a close fit between the capacity profile and the load duration curve.
 20. Capacity contracts should be consistent with quality and reliability objectives.
- Commodity procurement, pricing and price risk
 21. Requirements estimation should be sufficiently accurate to avoid unnecessarily high-cost spot-market supplies.

22. Types and quantities of supplies bought should reflect a well-thought-out strategy.
23. Occasional test procurements should be conducted to identify potential additional types of supply arrangements.
24. The company should promote the identification and use of sufficient numbers and types of vendors to meet its needs.
25. There should exist a sufficient number of suppliers identified and pre-qualified to meet possible short-term or emergency needs.
26. Information regarding identified and pre-qualified suppliers should be kept current.
27. Commodity procurement should be conducted pursuant to a well-defined process that has been adequately explained to all qualified suppliers.
28. Bid evaluations, including application of specific criteria, weightings, responsiveness, and supplier performance history, should be conducted with analytical rigor and without bias.
29. Objectives for purchasing and price risk management activities should be clear, comprehensive, and supportive of utility needs.
30. There should be a strong focus on liquid, transparent markets in gas procurement and price risk management.
31. Price risk management should be conducted pursuant to established and enforced policies and procedures.
32. The Company should be concerned about performance in commodity procurement and should take steps to resolve any identified problems.
- Supply capacity assets
 33. The interests of on-system customers should be the predominant drivers of policies and procedures for operation of the company's supply portfolios.
 34. The TPS program should be administered fairly and efficiently, affording TPS customers the same priorities in the same circumstances as system-supply customers.
 35. Unused supply-capacity assets should be marketed aggressively, to maximize benefits for on-system customers.
 36. Portfolio performance should be consistent with supply plans and supply-asset specifications, especially under peak-period conditions.
 37. Any supply-asset failure under peak-period conditions should automatically result in an inquiry into the reasons for the failure, and corrective actions should follow conclusion of the inquiry.
- Measurement and balancing
 38. Metering strategies should be designed to maximize reliance on measurements, and to minimize reliance on estimates and on differences among measurements.
 39. The company's metering strategies and their implementation should identify imbalances unambiguously, in order that other customers might be protected from associated costs.
 40. Balancing strategies and practices should be fair to all customer classes.
 41. Metering and testing programs should conform to industry standards.

Liberty's findings, conclusions and recommendations follow.

B. Findings

1. Organization, Staffing and Controls

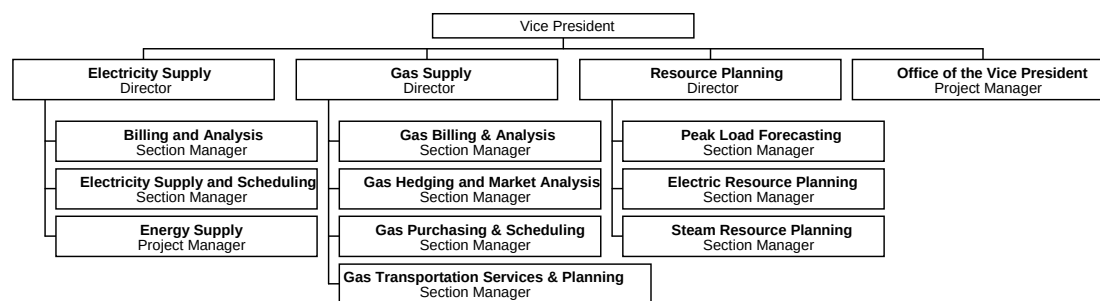
Liberty's findings in this task are presented in six parts. Those parts are as follows:

- Organization and Staffing
- Interaction with Other Departments
- Contracting Policies and Procedures
- Approval Authorities
- Sample Procurements, Capacity and Commodity
- Internal and External Audits.

a. Organization and Staffing

The Gas Supply department is in the Energy Management group, which, in turn, is part of the Enterprise Shared Services organization. A 2006 reorganization created Enterprise Shared Services. Gas Supply has a Director and four Section Managers, each with a staff of four to nine persons. The following chart depicts the organization of the Energy Management group.

CECONY Energy Management Group



The current Director of Gas Supply first performed this function from 1994 through 1999. He returned in 2006 after working in the Company's Gas Operations and Purchasing Departments. In 2007, he separated the planning function out of the Gas Purchasing & Scheduling section, moving it to the Gas Transportation Services section in order to allow the two Section Managers to focus on shorter-term and longer-term questions, respectively. Otherwise, the Gas Supply organization is as it was when the current Director assumed his duties.

Liberty reviewed the department's functional descriptions, position descriptions and incumbent resumes. All of that material was in order and current.

Personnel are well qualified, and highly experienced. Most have been with the Company for a number of years. The Section Manager, Gas Transportation Services & Planning, has exceptional qualifications for his position. In 2000, he came back into the utility from the retail marketing affiliate (CECONY Solutions). Thus, he spent some time as a consumer of services that he is now responsible for providing.

b. Interaction with Other Corporate Departments

Gas Supply regularly interacts with a number of other corporate departments. Within the Energy Management group, Gas Supply gets the base-load and use-factor information for capacity planning from the Peak Load Forecasting section in Resource Planning. Gas Supply and Electricity Supply occupy the same area on the same floor of the Company's headquarters. These two departments now work together in planning, placing, and tracking their physical and financial commodity positions.¹ Energy Risk Management, now part of the Finance area, monitors buying and selling activity for both Electricity Supply and Gas Supply.

Gas Supply also buys natural gas for the Company's steam generating facilities, and manages those resources for the SBU. Accordingly, Gas Supply reviews Steam Operations' requirements during the latter part of Gas Supply's *Morning Meeting*. Gas Supply adjusts its gas resources for the current day, and "sets up" those resources for the next day at the daily meeting. The role of the representative from Steam Operations is to bring estimates of the SBU's requirements on the days in question.

The Morning Meeting also includes a telephone call to Gas Control, which forms part of Gas Operations. Gas Control gets the adjustment and set-up information from Gas Supply. Gas Supply then nominates the indicated supplies to the Company's gas transportation and storage contracts.² Gas Control also verifies the quantities of gas received against CECONY's own nominations, plus those of the other users of the Company's gas transmission and distribution systems.

Gas Supply also has considerable interaction with other departments within Gas Operations. Gas Supply has responsibility for getting the gas to CECONY's city gates. The Gas Engineering departments in Gas Operations (Gas Transmission Engineering and Gas Distribution Engineering) ensure that CECONY's transmission and distribution systems can take the gas where Gas Supply gets it delivered, and then re-deliver it to customer locations. Gas Control makes that happen on a day-to-day basis. Gas Engineering also provides support for Gas Supply's evaluations of pipeline capacity alternatives.

Liberty found gaps in the interaction between Gas Supply and the other departments in Energy Management. An example is that Electric Resource Planning is beginning to use capacity-planning techniques that we view as industry best practice and that may produce a more robust approach to portfolio development. We found the gas capacity planners unaware of those techniques, which should be explored by the gas planners for applicability to their circumstances. Another area where we did not see close coordination is in sharing of information about electricity generators who fire with gas. Greater sharing of Electricity Supply's experience would enable Gas Supply to assure itself that it is pursuing any potential joint opportunities (with electricity generators) to optimize Gas Supply's portfolio..

¹ The new Allegro system, installation of which is nearly complete, will contain transaction information for physical purchases of electricity and natural gas, and for financial positions for both commodities.

² Procedure GSG-106.

Another area where we did not see coordination was in seeking opportunities that may be created by seasonality differences between gas and electricity demand. For example, Electricity Supply has contract rights to considerable gas-fired generating capacity. To the extent that winter needs for electricity are lower, there may be the potential, in effect, for using the generators' gas supply capacity to serve gas customer needs. The New York City area's emerging surplus of electricity generating capacity may create the potential for expanding any such opportunities further. Even though generators may not now be making much use of firm capacity, changes in a dynamic marketplace do not assure that this approach will continue indefinitely.

There is some degree of coordination already, although it does not reach an expected level. For example, the trading and hedging activities of the two departments have worked together, due to implementation of a transaction-tracking system that aims to capture and track all physical and financial positions for both businesses. Moreover, in recent months, the same person has placed the trades for both hedging programs, due to personnel shortages.³ That identity, at least, has caused the two businesses to share views about some important aspects of the market.

c. Contracting Policies and Procedures

The magnitude of the expenditures makes gas-procurement procedures an area for key controls developed as part of Sarbanes-Oxley (SOX) documentation and reporting requirements in the following areas:

- Procedure for purchasing natural gas
- Procedure to confirm and verify natural gas physical and financial transactions, including supply and peaking contracts, and to approve payment of invoices from marketers delivering gas from non-Company transportation contracts
- Guidelines for the management and filing of natural gas supply, storage and transportation contracts, and North American Energy Standards Board (NAESB) contracts.

The following figure summarizes the SOX gas-procurement controls.

³ In comments on Liberty's Draft Report, the Company stated "The two hedging groups communicate views about the natural gas market, and coordinate trading activities. However, trade execution has always remained separate." As noted above, however, at the time of Liberty's field work, the same person was executing the trades for both businesses.

SOX Matrix – Gas Procurement

Control No.	Transaction Cycle	Business Process	Sub Process	Control Objective	Business Risk Description	Control Activity Description	Audit Procedure	Assertion	COSO Component	Control Type
142	Energy Management	Gas Supply and Purchased Power	Procurement	Contracts are entered into with approved suppliers/counterparties.	Enter a contract with incorrect or unqualified suppliers/counterparties.	Methodology and process to approve and select suppliers/counterparties is established and documented.	Verify the existence of, and obtain an understanding of, the company's methodology to approve and select suppliers/counterparties.	C, E, A	Control Activities	Authorization
143	Energy Management	Gas Supply and Purchased Power	Procurement	All contracts are authorized and executed appropriately	Incorrect, unnecessary and unauthorized contracts are executed with suppliers.	Review process that ensures the correct supply and price is used in preparing the commodity purchase contract.	Review a sample of commodity purchase contracts and verify that accurate supply and prices are used. Determine that a review process exists that ensures contracts are properly authorized and correct.	C, A, V	Control Activities	Management Review
144	Energy Management	Gas Supply and Purchased Power	Procurement	All contracts are authorized and executed appropriately	Incorrect, unnecessary and unauthorized contracts are executed with suppliers.	(Significant) Policy and procedure that ensures that authorized individuals approve, modify and release new commodity purchase contracts.	Verify the existence of policy and procedures regarding authorized executed contracts and that they are clearly defined and appropriately communicated. Select a sample of contracts and determine if they were properly approved in accordance with the Delegation of Authorities.	C, E, A	Control Activities	Authorization
145	Energy Management	Gas Supply and Purchased Power	Procurement	All orders are approved, modified, and released by authorized users	Orders are placed, approved, modified and released by unauthorized user.	Access limitations to individuals authorized to approve, modify and release new purchase and/or hedging requisitions.	Verify that only authorized individuals have access to approve, modify, and release requisitions. Test requisitions to determine if they are approved.	C, E, A	Control Activities	System Access

The Gas Supply department's *Operating Document Guidelines* cover supply procurement, use of pipeline capacity, use of storage assets, and monthly planning. These Guidelines include documentation requirements. Work processes have undergone periodic review by outside consultants. Processes and procedures for the Gas Billing & Analysis section underwent review in 2005, and those of the Gas Purchasing & Scheduling section and of the Gas Hedging & Market Analysis section followed in 2007. In all three cases, process changes to improve controls and reduce errors resulted.

d. Approval Authorities

A Delegation of Authority document governs the entry of binding commitments. The document specifies the expenditure levels that: (a) the Gas Supply department can undertake on its own, (b) require officer approval, or (c) must go before the board of directors. Any commitment involving expenditures of more than \$10 million and that lasts longer than one year,⁴ must go to the board. That limit covers most term contracts for capacity and commodity. Gas Supply presents a plan to the board for approval of monthly gas purchases. Commitments requiring submission to the board are preceded by explanatory materials from Gas Supply.

e. Sample Procurements, Capacity and Commodity

Liberty reviewed sample procurements for both delivery capacity and commodity. The capacity review encompassed the decision package for the Company's commitment to capacity on the new Millennium Pipeline system. Management transmitted that package to the CECONY board in January 2006. The commodity review examined the results of a solicitation conducted in the summer of 2007, for gas to be delivered in the winter of that year.

The decision package for the commitment to the Millennium capacity consisted of presentations describing the rationale for the commitment and the comparative advantages of the alternative selected. The presentations required some background knowledge that: (a) a need for additional

⁴ Delegation of Authority 3.7B

storage capacity had already been established, (b) the storage facilities that are connected to the Millennium are viable choices, and (c) there are enough different storage facilities connected to Millennium to offer some competitive options. Other documents provided this background. A memorandum to the board requesting authorization to enter into the requisite contracts comprised part of the package. The decision package and the approved resolution authorizing entering the contract formed the documentation of the decision. With the additional background information, Liberty found the package to be complete, and of a caliber that one would expect from a large gas utility company.

Liberty's commodity review of a solicitation for city-gate delivered supply for the winter of 2007/08 disclosed that the bidders' offers had not been maintained. The materials provided did include:

- The request for proposals
- The bidder response form
- The list of bidders
- A list of the offers received
- A spreadsheet showing Gas Supply's comparative analysis of the offers.

Liberty found the request for proposals and response form to be clear and complete. The bidders list included about 20 firms for winter-period city-gate delivered supply; other solicitations had up to 50 prospective bidders. The Director of Gas Supply advised that the Company maintains standard form gas-supply contracts with 50 to 60 counter-parties.

Liberty inquired whether Gas Supply's handling of offers of supply and its selection of suppliers from among offerors had been reviewed by CECONY's internal auditors or by other internal or external process reviewers. Gas Supply provided an Internal Auditing Report, dated May 2003, reviewing the Company's award of gas-supply contracts for the winter period November 1, 2001 through March 31, 2002. That audit found that Gas Operating Procedure GS-105 required Gas Supply to retain bid documentation for six years; however, the department had not retained some bid documentation. Internal Auditing recommended that all bid documentation be retained, as required by GS-105. The audit has not been repeated, and apparently this deficiency persists, as Liberty's commodity review exercise demonstrated that bidders' offers continue not to be kept.⁵

f. Internal and External Audits

Gas Supply has undergone some process reviews, as discussed above, but award of gas-supply contracts is not routinely examined by Internal Auditing. As noted above, Internal Auditing last performed a review of gas purchasing in 2003, finding deficiencies that still exist, at least in part.⁶

⁵ In comments on Liberty's Draft Report, the Company reported that, after Liberty's field work had been completed, Internal Audit completed a review of a subsequent competition. At the time of completion of that review, the Company reports that IA's recommendation regarding retention of documentation of responses had been implemented. As noted above, at the time of our review, Liberty was told that bidders' responses were not retained.

⁶ As noted above, in comments on Liberty's Draft Report, the Company reported that this deficiency had been corrected.

Internal Auditing examines gas invoices and payments reconciliation, and approval of purchase orders, annually in the context of Sarbanes-Oxley audits. Internal and external auditors also routinely perform examinations of the Company's gas in storage. Audits confirm that tracking and maintaining of storage balances and inventory valuation take place according to applicable procedures and guidelines, and that there has been compliance with Sarbanes-Oxley control and reporting requirements. Audits of Gas Supply's award of gas-supply contracts are apparently not performed frequently, however.

2. Supply Capacity Planning

Supply capacity planning is conducted by the Gas Transportation Services & Planning section within the Gas Supply department. Liberty's findings in this task are presented in four parts:

- Estimating Capacity Requirements
- Evaluating Capacity Portfolio
- Examining Capacity Alternatives
- Recent Capacity Changes.

a. Estimating Capacity Requirements

Gas Supply receives each year a peak-day requirements forecast and a forecast of base load and use factors, for estimating capacity requirements for CECONY's firm gas customers, both sales and transportation. This information comes from the Peak Load Forecasting section in the Resource Planning department. Gas Transportation Services & Planning uses those parameters and a design weather profile to develop a forecast of firm customers' capacity requirements for each of the next ten years. The design weather profile uses weather data recorded for the winter of 1933/34.

Electricity generators operating *behind* CECONY's city gates bring their own capacity or supply to the city gates. It is accepted that electricity generators serving New York City generally use interruptible or released-firm pipeline capacity. Most do not have firm capacity with primary delivery rights to CECONY's city gates. The SBU supply comes through using pipeline capacity under contract to it, plus city-gate purchases and allocations from the gas customers' portfolio. Gas Supply utilizes available capacity to provide balancing services to the SBU, to electricity-generation customers, and to interruptible transportation customers. The costs of that capacity go into the gas-supply costs charged to gas customers, but are offset by revenues generated through the provision of those services. The costs of this capacity flow through the purchased-gas-cost recovery mechanism, but the revenues received from the provision of these services are largely addressed in base rates.

CECONY provides the delivery capacity used by suppliers that participate in its Retail Choice program. Those suppliers get pipeline capacity allocations on a "slice-of-the-system" basis; i.e., each supplier's allocation, as nearly as possible, mirrors capacity on the same mix of pipelines as CECONY's, with the amount of capacity determined by that supplier's customer mix. Suppliers receive capacity allocations from that which remains after the Company's operational requirements have been addressed. The Company also reserves capacity required for re-delivery of stored quantities to its city gates. Pipeline capacity costs are blended, however, in an effort to bill all suppliers (including CECONY) the same cost for a unit of pipeline capacity. The amount

of capacity assigned is determined by what each supplier's load would be on an average January day.

Retail Choice suppliers deliver to CECONY the same quantity of gas on each day within each month. CECONY holds the storage and peaking resources used to convert the constant deliveries that it receives into deliveries that fit each customer's usage. CECONY conducts studies to determine what resources it needs to provide the load-following and balancing services necessary to provide that conversion. The Company acquires those resources, and includes the costs in its purchased-gas costs.

Estimates of particular factors that affect customer demand drive Load Forecasting's estimates of growth in existing markets. These factors include employment and the relationship between natural gas prices and fuel oil prices. Estimates for new business come from Marketing and Sales personnel at the Company's four operating areas (Manhattan, the Bronx, Queens and Westchester County). Large-volume new loads are picked up individually and tracked through the Company's Customer Operations Reporting System (CORS), which is maintained by the Energy Services group within Electric Operations. These various sources of growth are in the load forecasts that Gas Supply receives from Resource Planning. Details of these processes are presented in Chapter VII, *Load Forecasting*, of this report.

Requirements for annual capacity include capacity required to provide load-following and balancing services for the Retail Choice suppliers, and for the other large-volume customers who use those services. Capacity for load-following and balancing do not add to peak-day capacity requirements, but it increases the total quantities to be supplied by the Company's capacity portfolio.

b. Evaluating Capacity Portfolio

Spreadsheet models assess the adequacy of the contracted capacity portfolio relative to forecasted capacity requirements. An optimization model (New Energy Associates' SENDOUT model) validates the results of the spreadsheet models. The optimization process uses the same input parameters (*e.g.*, design weather profile, base load and use factors) as the forecast of capacity requirements.

The process used to compare contracted capacity with capacity requirements yields the shape of any capacity deficiency. If any additional capacity appears to be needed, Gas Supply/Gas Transportation Services & Planning knows the duration of any requirement for additional capacity, as well as its peak.

Until about 2003, the TPSs operating in CECONY's service territory preferred to obtain their own pipeline capacity, rather than taking assignment of the Company's capacity. After that time, however, the market for capacity delivering to CECONY's city gates tightened considerably, increasing the TPSs' costs for supplying their customers. As the market tightened, more of the TPSs requested assignment of CECONY's capacity. In response, CECONY, which had acted as an administrator of its existing capacity contracts, became an aggressive seeker of additional capacity. The chart on the next page shows that virtually all of the Company's capacity changes

after the winter of 2003/04 were increases. In 2007, the NYPSC ordered⁷ that CECONY provide pipeline capacity to its city gates for all of the approved TPSs operating in its service territory.

c. Examining Capacity Alternatives

The Company plans on the bases that its customers' requirements are growing, and that supply projects to serve the NYC market take a long time to come to fruition. Thus it must encourage project developers in the hope that some of them will succeed in time to provide the capacity required by the Company's customers. The Company identifies projects to provide additional capacity through research and meetings with developers. Evaluations are based on screening across six criteria. On the basis of this screening, CECONY identifies projects as viable (or not), and puts the survivors through further discussions and negotiations. These criteria are:

- Reliability
- Flexibility
- Sustainability of supply
- Feasibility
- Environmental impact
- Cost.

The Company reports that it is actively negotiating with multiple developers whose proposed projects have met these screening criteria. CECONY's objectives for the negotiations are as follows:

- To increase deliverability into the New York City area
- To obtain a new point of delivery into CECONY's gas system
- To provide access to storage
- To reach as many supply areas as possible.

One potential source of alternatives that may be available is the capacity (to the extent it is firm) held by others (*e.g.*, marketers, large-volume customers and electricity generators). Liberty inquired about the state of Gas Supply's knowledge relevant to the exploring of such potential alternatives. The factors addressed with Gas Supply included:

- How much capacity exists to CECONY's city gates
- How large is the portion held by others (*i.e.*, non-CECONY)
- Who holds how much of that portion
- What are their demand patterns
- How can CECONY "do business" with them to take advantage of potential complementary needs?

The Company conducted the first three of those steps in the course of a long-term supply-planning exercise conducted during the first half of 2008. That source (capacity held by others) was used for delivered peaking supplies prior to the entry into service of the Company's new capacity on the Millenium Pipeline system. The Company expects to use capacity held by others

⁷ State of New York, Public Service Commission Case 07-G-0299, *In the Matter of Issues Associated with the Future of the Natural Gas Industry and the Role of Local Gas Distribution Companies – Capacity Planning and Reliability*, "Order on Capacity Release Programs", issued and effective August 30, 2007.

as necessary to provide transitional supply services prior to the entry into service of its next supply project.

d. Recent Capacity Changes

The following table presents a summary of changes in the Company's pipeline and storage contracts over the last five years. In addition to the changes listed, capacity on the new Millennium Pipeline system entered service on December 22, 2008. Following existing rights-of-way in southern New York, Millennium runs from Corning, New York, through affiliate O&R's service territory, to an entry point into the Algonquin pipeline system at Ramapo, New York. That route traverses an area of active storage development. The upstream end of the new system also ties into other pipeline systems, which, in turn, give access to a variety of U. S. and Canadian sources of supply.

Recent Changes to CECONY Pipeline and Storage Capacity Contracts

Pipeline Capacity

Capacity changes from 2003-04 Winter to 2004-05 Winter:

- Iroquois RTS, 5,000 dth/day, expired 3/31/04
- Tennessee FTA, 11,910 dth/day, expired 3/31/04
- New Iroquois RTS, 20,000 dth/day, expiration date 4/30/07.

Capacity changes from 2004-05 Winter to 2005-06 Winter:

- New Iroquois RTS12, Oct.– Mar., K#56064, 40,000 dth/day, expiration date 4/1/06.
- New Tennessee FTA from Stagecoach Storage to Citygate, 25,000 dth/day, expiration date 3/31/06.

Capacity changes from 2005-06 Winter to 2006-07 Winter:

- CECONY Released 10,559 dth/day STX/ETX to M3 on K# 800410 to New Jersey Resources (NJR) and acquired 14,770 dth/day ELA to M3 on K# 910584 from NJR.
- Iroquois RTS12, K#56064, 40,000 dth/day, expired 4/1/06.

Capacity changes from 2006-07 Winter to 2007-08 Winter:

- New Iroquois RTS12, K# 56014, 64,000 dth/day, expiration date 10/31/08
- Iroquois RTS12, K# 56004, 20,000 dth/day, expired 11/1/07
- Iroquois RTS12, K# 56009, 20,000 dth/day, expired 4/1/07.

Storage Capacity

Storage changes from 2004-05 Winter to 2005-06 Winter:

- Stagecoach MDWQ increased from 40,000 dt to 65,000 dt
- Stagecoach Storage capacity increased from 1,216,000 dt to 1,976,000 dt.

Storage changes from 2006-07 Winter to 2007-08 Winter:

- Transco Eminence MDWQ increased from 52,000 dt to 142,500 dt
- Transco's Eminence Storage capacity increased from 527,000 dt to 1,424,000 dt.
- Stagecoach Storage capacity increased from 1,976,000 dt to 3,976,000 dt.

The new Millennium contract covers deliveries of 175,000 Dth/day.⁸ 50,000 Dth/day of that capacity is for O&R. 25,000 is delivered off of Algonquin, and can be delivered either to O&R's service territory or to CECONY's northern Westchester gate stations. The remaining 100,000 Dth/day comes into CECONY's systems at its Hunts Point interconnection with Iroquois.

As noted above, CECONY had been using city-gate delivered peaking services to assure service to its customers while it waited for the new Millennium capacity to enter service. Those services provided 109,000 Dth/day of capacity to CECONY and O&R in the winter of 2007/08. Millennium's entry into service ended the Company's requirement for those services, and

⁸ The contract provides for shipment of 180,000 Dth/day; the difference is pipeline fuel.

provided some additional capacity to accommodate growth in customer requirements. CECONY's projections show a small capacity deficiency after the winter of 2008/09. The Company is therefore discussing with project developers possible participation in one or more new supply projects.

3. Commodity Procurement

Liberty's findings in this task are presented in three parts. Those parts are as follows:

- Commodity Purchasing
- Price Risk Management
- Performance Benchmarking.

a. Commodity Purchasing

i. Purchase Plans

Gas Supply annually develops up to three Natural Gas Purchase Plans: Summer, Annual, and Winter. The purpose of these plans is to provide for the Company's supply needs on an annual, seasonal, monthly, and daily basis, to meet: (a) gas-customer requirements, (b) Steam Operations requirements, and (c) summer storage-injection requirements. The goal for each plan is to procure the lowest reasonable cost supply through a combination of: (a) a Request for Proposals (RFP), (b) monthly and daily spot purchases, and (c) evaluation of alternative supply proposals, if applicable. Supply needs at the various receipt points on the pipeline systems under contract to the Company are established based on demand requirements, storage injection requirements, existing supply contracts at each receipt location, planned storage withdrawals, capacity released at each location to marketers participating in the Company's Retail Choice Program, balancing requirements, and operational constraints at each receipt location. The following paragraphs describe the three RFPs conducted most years as part of the gas-acquisition process.

Summer RFP: Initiation of the Summer RFP comes in early February; purchases are for the summer (April through October). Gas purchased through the Summer RFP meets summer base load, summer storage injection, and Steam Operations requirements. Total supply needs during the summer result from subtracting existing gas supply from total gas customer requirements, storage injection requirements, and Steam Operations requirements. The total supply needs at each receipt point are determined based on the available open capacity at each. CECONY determines available open capacity by subtracting from the total firm transportation capacity at each receipt point, the existing supply at each, capacity released to marketers at each, and balancing requirements.

Annual RFP: Annual RFP initiation comes in early May; purchases begin at the start of the coming winter (November 1). The gas purchased through the Annual RFP meets gas-customer requirements, Steam Operations requirements, and part of summer storage-injection requirements. The Annual RFP solicits offers for year-round and winter-only contracts, ranging from one-year to five-year terms. During the winter, the Company fills all open available firm transportation (FT) capacity with flowing gas supply and re-deliveries of storage gas. Total supply needs at each receipt point are determined based on the available open capacity at each. The available open capacity determination results from the same process used for the Summer

RFP, but that process requires adjustment for the receipt-point requirements for delivering stored gas to the Company's city gates.

Winter Delivered Services RFP: The Winter RFP is initiated in early August; purchases are effective November 1 through March 31 of the succeeding winter. The gas purchased through the Winter RFP is required to meet gas customer peak-day requirements, and Steam Operations' peak-day requirements. These supply purchases are at the city gate, or in the market area close to the Company's city gates, in order to allow transport to the Company's city gates through its own pipeline capacity. Peak-day supplies are required to meet spikes in daily requirements above total firm transportation capacity, city-gate delivered supplies, and storage-withdrawal deliverability. Peaking supplies typically come through short-duration contracts, ranging from 15 to 60 days, with high volume deliverability.

During the winter, the delivery points considered for peaking and base-load, city-gate- delivered supplies are based on the maximum available capacity at each of the city gates within the Company's distribution system, after deducting the use of each gate for other supplies.

As noted, the annual RFPs seek a mix of one-, three- and five-year supply arrangements, in an effort to spread the Company's requirements out sufficiently that they do not affect markets. Longer-term supply purchases take place in production areas, in order to avoid adverse changes in basis differentials over the life of the contract.

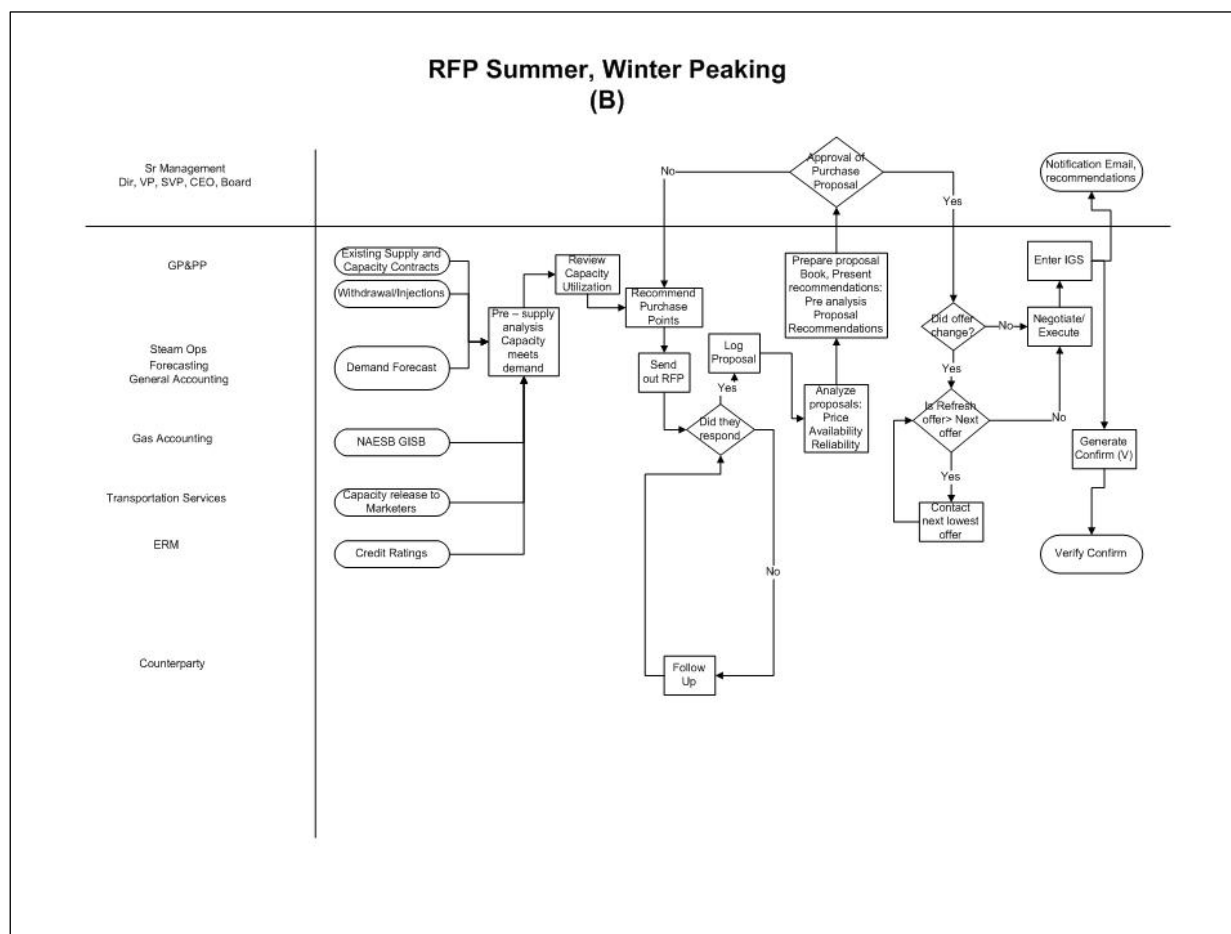
ii. Requests for Proposals

Gas Supply distributes its RFPs via email to counterparties with whom the Company has fully-executed master gas-purchase agreements. The RFP solicits offers for various receipt point locations, types, terms, and prices. Offers are sent back via email, to a secured public folder. The offers are tracked, logged, and then entered into an Excel database for analysis. Evaluation of offers in the production consider total unit cost, which consists of a premium or discount to the Platt's Inside FERC First of the Month Gas Price (Inside FERC) Index for the location proposed, plus a reservation fee. Evaluation of offers in the market area use the Inside FERC Index price for that location, plus any premium, or on the market-area basis price relative to the NYMEX settlement price.

The criteria for making purchase recommendations comprise least-cost supply, operational flexibility, and reliability. Once the recommended purchases have been approved pursuant to the Delegation of Authority, suppliers get an opportunity to update their offers to reflect changes in market conditions since offer submission. If a supplier's updated offer exceeds that of the next-lowest-cost supplier, its offer is passed over, and the new lowest-cost supplier is selected. [REDACTED]

An external consultant reviewed the RFP process in 2007. The flow chart for the RFP process prepared at that time follows.

RFP Flow Process



iii. Supplier Qualification Process

CECONY uses the North American Energy Standards Board (NAESB) contract for the purchase and sale of natural gas on short-term or long-term bases. Under the NAESB contract, parties can include special provisions or relevant documents as part of the contract.

The Company's supplier-qualification process involves five stages: (a) Referral, (b) Contact, (c) Negotiation, (d) Review & Resolution, and (d) Execution. Execution of NAESB agreements involves comments, analysis and review by the Law Department, Risk Management - Utilities, Gas Supply, Gas Purchasing & Scheduling, and any other relevant business group. The Contract Administrator (Gas Supply) serves as liaison among Gas Supply, Treasury (Risk Management) and the Law Department, and facilitates the negotiation and execution process for all NAESBs. Additional details of the supplier-qualification process follow.

Referral Stage: the Company uses contacts in the natural gas industry, CECONY staff recommendations, or solicitation from interested counter-parties to identify prospective suppliers.

Contact Stage: the Company provides a standard NAESB package, plus any other necessary attachments, to the prospective counter-party via email. The standard package includes:

- Standard Base Contract, including CECONY's standard elections
- Special Provisions for the NAESB
- Appendix A - Certifications and Clauses
- Representation Pages
- O&R Certificate - This document grants authorization to the Vice President, Energy Management to execute the NAESB on behalf of our utility affiliate, Orange & Rockland Utilities
- Resale Certificates (Louisiana, New York, New York City, Multi-Jurisdictional)
- ACH Vendor forms.

Negotiation: during this stage in the process, the Law Department and Risk Management - Utilities review the contract and any redlines or edits provided by the counter-party. Gas Supply aids the Law Department and Risk Management - Utilities in resolving any outstanding items related to the contract.

Review & Resolve: during this stage in the process, the Contract Administrator (Gas Supply) ensures that final clean copies of the contracts prove consistent with negotiated elections. Also during the process, the Law Department provides final approval and sign-off on the contract. Proper due diligence is followed to ensure compliance with internal and regulatory standards.

Execution: during this final stage of the process, the contract is executed and filed with the appropriate regulatory agency (NYPSC). The contract is also filed with CECONY's Corporate Secretary and input into the contract system of record.

Once a NAESB contract has been established, in order to gain experience with the new supplier and test its reliability, CECONY purchases spot gas from the new supplier, on a daily or monthly basis, if it has the lowest reasonable cost supply. When the Company solicits offers through the RFP process, if a new supplier has the lowest reasonable cost supply, the Company may limit the amount of gas purchased from the new supplier (*e.g.*, limit the transaction to 20,000 Dth/day) due to the lack of experience with that supplier.

The Director of Gas Supply reports that the Company maintains contracts with 50-60 suppliers. Not every contracted supplier bids on every competition, however. CECONY creates separate bidders' lists for each RFP.

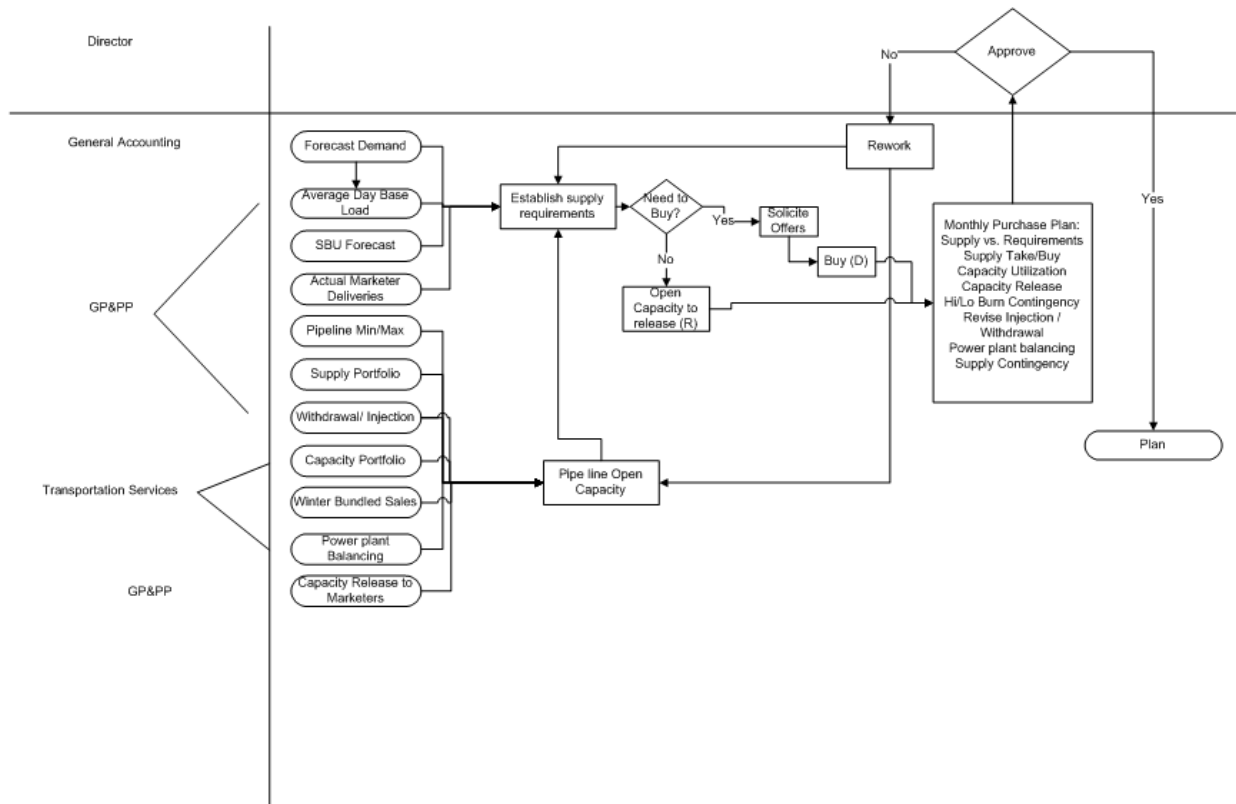
iv. Non-RFP Supplies

Gas Supply makes liberal use of a "take-or-release" feature in its supply contracting. For a small reservation fee, the Company can decide on a monthly basis whether to take the contracted quantity of gas, or release it to other markets. This feature provides necessary flexibility especially in the shoulder months, when storage alone is not sufficient to handle day-to-day fluctuations in customer requirements. CECONY's gas analysts have the authority to buy or sell daily, as necessary to match supplies with customer requirements, but the Company prefers to stay out of both daily and monthly markets.

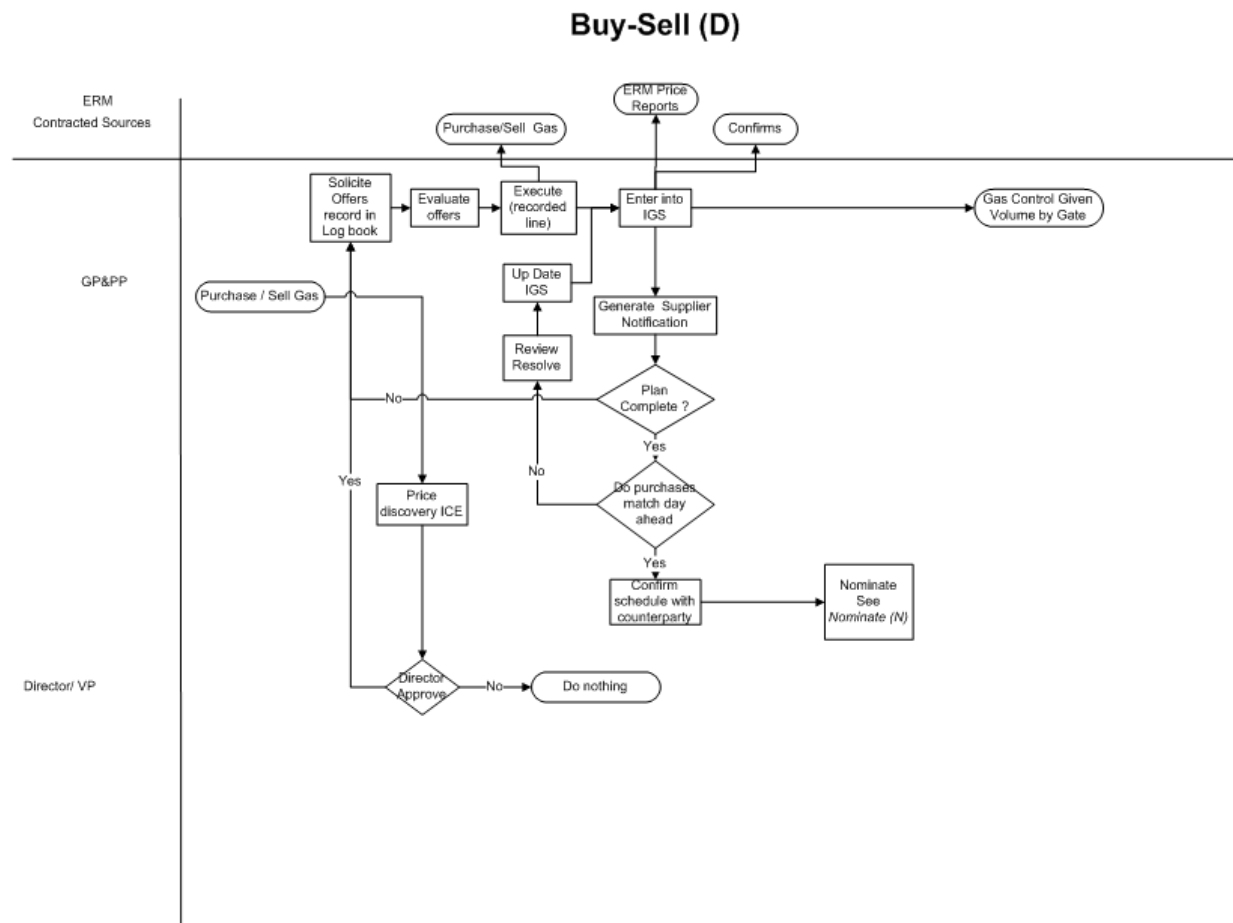
Flow charts for Monthly Set Up and the (daily) Buy-Sell processes, taken from the recent process review, follow.

Monthly Set Up Flow Process

Monthly Set Up



Monthly Set Up Flow Process



b. Price Risk Management

i. Objectives

The primary objective of the Company's gas hedging program is to reduce volatility in the cost of gas delivered to the Company's city gates. The primacy of this objective conforms to the expressed desires of the NYPSC. The principal expression of this preference came in a 1998 Commission policy statement. The Manager of the Company's Gas Hedging & Market Analysis Section meets with PSC Staff annually, to brief them on performance of the hedging program in the year just completed, and to present plans for the coming year. Those briefings provide an occasion for any additional input on policies and strategies that the Staff wants to provide.

Price management comprises a secondary hedging objective.

[REDACTED]

ii. Strategies

The Company uses two basic gas hedging strategies, flowing and storage. [REDACTED]

Simply buying gas and putting it into storage provides a basic cost hedge during the winter, when the stored gas would be withdrawn, since the price of gas in the winter is usually higher than prices during the April through October injection months. Depending on the level of futures prices relative to prices in the recent past, the Company may further hedge by buying futures contracts for gas during the injection months. Once the gas is in a storage facility, put options may also be purchased for withdrawal months if the Company feels that the price of the injected gas is high. [REDACTED] Put options are used when the inventory price is high relative to recent history, and when, after adding the cost of the option to the inventory price, the inventory price is below the option's strike price.

iii. Practices

To manage price volatility, the Company may use natural gas storage, enter into short- and longer-term fixed-price gas commodity and pipeline capacity purchases, make spot-market gas purchases, and use financial hedges. In recent years, hedging activity has focused on futures contracts and options contracts.

Policy guidance from the NYPSC has favored limiting the duration of the gas hedging program to one year. The principal variables in recent programs have been schedule (when to buy), instrument (*i.e.*, futures contracts or options), and quantity (how much of each to buy). Particular combinations of those variables are "back-casted" under actual market conditions to see what combinations would have yielded the best outcomes in terms of volatility and gas cost to customers.

Each year's recommended program comes before CECONY's CEO in the spring and then to the Finance committee of the Board of Trustees for approval. Most years' presentations to the CEO

also cover performance of past programs. Presentations made annually to the NYPSC contain similar analyses of past performance and recommendations for the current program.

iv. Controls

A Corporate Risk Oversight Committee and a Regulated Risk Management Committee oversee the hedging programs for the gas-supply and electricity-supply functions. Corporate Instruction CEI-205, Energy Risk Management provides the charters, responsibilities, and authorities of the two committees. In general, the Risk Oversight Committee reviews and sets policy for the Company's gas and electricity procurement obligations. The Regulated Risk Management Committee focuses on the mechanics of compliance with the Company's risk-management policies and procedures. The two committees meet monthly to review the performance of the hedging programs, and to discuss issues within their respective purviews.

The Company also has an Energy Risk Management staff, which verifies hedging transactions, and checks them for compliance with policies and procedures. Energy Risk Management also monitors the credit positions of the Company and of its counter-parties, and initiates any necessary actions if credit positions move out of compliance with agreements with each counterparty. Energy Risk Management reports to the Vice President and Treasurer, who chairs the Regulated Risk Management Committee. Energy Risk Management also serves as staff to the Regulated Risk Management Committee.

The Regulated Risk Management Committee occasionally studies a particular issue. A current example of such an issue is whether to move Company trading and hedging activities away from bilateral transactions to exchanges, such as the New York Mercantile Exchange (NYMEX). In such an event, the Committee forms a Risk Control Working Group, with representatives from various affected departments, to carry out the study.

The two committees and the Energy Risk Management staff conduct their work pursuant to Corporate Policy Statement 620-1, Energy Risk Management Policy. The Energy Risk Management staff developed Energy Risk Procedures (ERM-100) and Energy Credit Procedures (ERM-200). Energy Risk Management was constituted in 2001; the two sets of procedures comprised its first task. Issued initially in 2002, the procedures have been updated several times since then. The procedures are "owned by" the Regulated Risk Management Committee, which must approve any revisions to them.

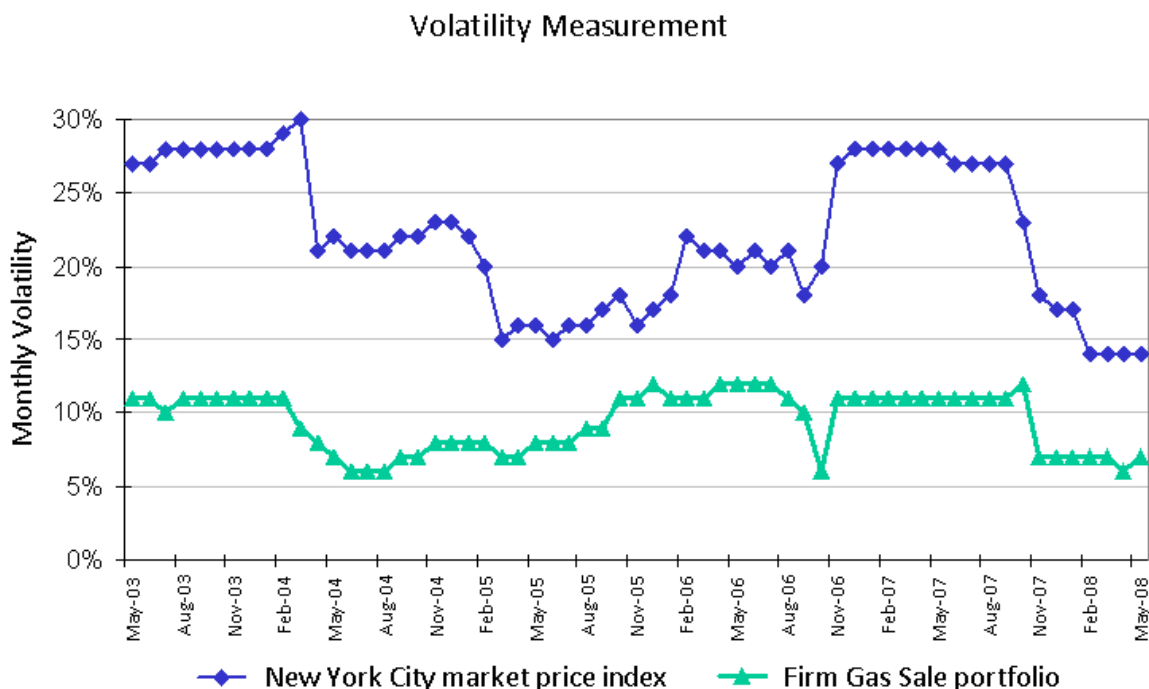
One of the duties of the Regulated Risk Management Committee is to consider specific hedging strategies to be employed by the Company's gas and electricity hedging personnel. These strategies address particular hedging instruments (*e.g.*, futures or options), and the circumstances in which each one might be used (*e.g.*, the use of futures contracts in hedging flowing gas). Documents addressing each such strategy came for required approval before the Regulated Risk Management Committee in 1997. At least some of the strategies have undergone modification since that time, but each modification required prior RRMCA approval.

The Company is currently in the late stages of implementing a sophisticated new position-tracking system, intended to incorporate physical and financial positions for all of the

Company's utility businesses. Acquired in response to a recommendation from the Company's external auditors, the new system will replace a variety of spreadsheet applications. The new system (Allegro) will also facilitate controls, as it tracks and records approvals for each transaction.

v. Program Effects on Volatility

The following graphs show how CECONY measures the effects of hedging (including capacity and financial transactions) on the Company's portfolio volatility; *i.e.*, the principal focus of that program. The first graph, of gas supply volatility, shows that over the period presented (the five-year period ended May of 2008), the volatility of the Company's firm gas portfolio was half (or less) of the volatility of a comparable market price index at the city gate.⁹ The second graph, of city-gate delivered gas cost, shows the mitigating effect of the Company's hedging program on variation in that cost.



⁹ NYPSC Staff point out that much of the reduction in volatility shown in this graph is due to CECONY's use of firm pipeline-capacity contracts from the production area to the city gate. Use of these contracts eliminates the volatility in the city-gate price that is due to changes in the basis differentials between production-area prices and New York-area city-gate prices.

[illegible]

c. Performance Benchmarking

- LDC supply portfolio management during the winter heating season
- Gas supply diversity
- Gas supply hedging
- Commodity cost comparison of New York state regulated utilities.



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published market index, or compared to current transactions on ICE. Thus, the Company believes that it is paying market prices, and it does not try to get behind those prices for other comparisons.

4. Capacity Management

Liberty's findings in this task are presented in four parts. Those parts are as follows:

- Gas Dispatch Process
- Retail Choice Program
- Capacity into Secondary Markets
- Relationships with Affiliates.

a. Gas Dispatch Process

Dispatch for CECONY's gas system is conducted in conjunction with the other two utilities that serve the New York City area; *i.e.*, National Grid of New York and National Grid of Long Island. The three utilities operate certain transmission facilities within their respective systems together, which allows each of them to nominate supplies at certain gate stations on the others' systems. The common nomination points are:

[REDACTED]



Weather determines how much gas can physically be taken at the shared gate stations. Thus, allocation of the shared capacity on Tennessee, Texas Eastern and Iroquois among them forms the first step in dispatch for all three companies.

All three companies balance on Transco. Flows through the Transco gate stations are pressure-controlled, and the three companies' connections to each other are metered. Thus, at the end of each day, the three companies notify Transco how much gas each one received, after netting out the flows among them. CECONY's Gas Control reports that, on most days, gas flows from CECONY's system into the systems of the other two companies.

Third-party suppliers (TPSs) nominate their expected flows into CECONY's Internet (TCIS). That data is down-loaded to the Natural Gas Tracking System (CENTS), which is the Company's gas management system for its transmission and distribution systems. TPSs are also responsible for nominating their supplies to CECONY's city gates on the pipelines' electronic bulletin boards. At the end of each day, CECONY's Gas Control department matches the flows received at the Company's city gates to the flows delivered from each one.

The Company reports that flows on its transmission and distribution systems are roughly one billion cubic feet per day (Bcf/d) year-round. Flows in the winter are largely to space-heating customers and the Company's steam business unit (which also peaks in the winter), whereas flows in the summer are more to industrial and power-generation customers.

The Company also reports that flows from peak-period assets have been good. CECONY has a large liquefied natural gas (LNG) facility on its system at Astoria, and has contracted capacity in National Grid's LNG facility at Providence, RI. The Company is updating its on-system LNG facility, but that work is being accomplished on a schedule that allows it to be available during the winters.

b. Retail Choice Program

The Company reported that the capacity-management aspects of its Retail Choice program resulted from collaborative meetings among the Company, the TPSs and the NYPSC Staff over several years. As reported earlier, the Company holds the storage and peaking capacity required to provide load-following and balancing services to its own and the TPSs' customers, but pipeline capacity is assigned to the TPSs in proportion to their customers' requirements.

The Company reported that it does its best to provide each TPS with a "slice of the system," which means, as nearly as possible, the same combinations of capacity on the same pipeline systems that serve the New York City Area as CECONY itself has.¹⁰ Capacity assignments are done once per year, to go into effect on November 1 of each year. Monthly adjustments thereafter account for each supplier's gain or loss of customers. Assignments are made at the full FERC Tariff rate, and are intended to be sufficient to serve each supplier's customers on an average January day. When a supplier loses customers, the capacity reverts to CECONY, for possible reassignment to another supplier that has increased its customer count.

The Company reported that customers of TPSs now account for about 38 percent of its peak day, and about 38 percent of its annual load. Liberty did not interview any TPSs who are active on the Company's system. Liberty accessed the Company's web site for TPSs (and electricity suppliers), and found it comprehensive and easy to understand. Liberty also reviewed the Company's Gas Sales and Transportation Operating Procedures Manual, and found it to be comprehensive and fair.

c. Capacity into Secondary Markets

Gas Supply buys pipeline capacity for its own full-service customers, for most of the customers of the TPSs, and for the Company's SBU. Gas Supply also buys the storage and peaking capacity that it uses to provide load-following and balancing services to those three groups of customers, plus other users of its transmission and distribution systems. While Gas Supply tries to buy only the capacity required to serve its customers' requirements, there are inevitably times when capacity is under contract and available, but is temporarily not required for the provision of contracted and tariffed services to customers. This temporarily-available capacity is what LDCs usually place in secondary markets, through short-term capacity releases or off-system sales.

¹⁰ In fact, capacity allocations are adjusted to make them easier to manage, but a cost-adjustment mechanism attempts to make all suppliers' pipeline capacity costs the same.

The Gas Supply department, Gas Purchasing & Scheduling section, performs this function for CECONY. The department prefers short-term capacity releases over off-system sales, as most of its available capacity occurs in the summer, when adding gas to the capacity would add little value. Most releases are pre-arranged, as capacity is usually available in locations that are hard to value, such as within production areas, or within a particular market-area rate zone (such as Tennessee Gas Pipeline Zone 4). Gas Purchasing & Scheduling has an e-mail list that it notifies when capacity is available. It negotiates the terms of each release with parties who respond. Gas Purchasing & Scheduling reports that it has 110 names, representing 55 companies, on its e-mail list. CECONY is therefore comfortable that it is in touch with everyone who might be interested in the capacity. Gas prices at different locations, from sources such as ICE, are used to estimate what a particular segment might be worth, but terms are negotiated individually with responders.¹¹

Realizations from secondary-market activities are part of Non-Firm Revenues in the Company's current Gas Rate Plan. Under that Plan, the Company retains the first \$35 million of Non-Firm Revenues realized in each Rate Year. Amounts above \$35 million are shared, according to the following schedule:

- Over \$35 million to \$50 million: 80 percent to customers, through credits to the Company's purchased-gas cost accounts, 20 percent to the Company
- Over \$50 million: 75 percent to customers, 25 percent to the Company.

Realizations below \$35 million may be deferred for future recovery.

In addition to capacity-release revenues, Non-Firm Revenues include the following:

- Margins from interruptible and off-peak firm services
- Revenues from balancing services.

Realizations for Rate Year October 2007 – September 2008 were as follows:

• Non-TPS capacity release	\$5,723,000
• Bundled sales and exchanges	1,291,000
• Balancing charge revenues	4,570,000
• Power generation fixed transportation charges	20,186,000
• Power generation variable transportation charges	1,196,000
• NYPA variable transportation charges	1,017,000
• SC-12 Rate 1 interruptible sales	10,150,000
• SC-9 interruptible and off-peak firm sales	10,125,000
• SC-16	<u>2,202,000</u>
• Total	\$56,460,000.

¹¹ In comments on Liberty's Draft Report, the Company points out that the negotiated result is subjected to another round of bidding when it is posted on the relevant pipeline's electronic bulletin board. Thus, the Company considers that the capacity in question has been subjected to two rounds of bidding, one in the e-mail solicitations and a second on the pipeline's EBB. The Company feels that this two-round process assures fair value for the capacity.

Of these categories, the Non-TPS capacity release, Bundled sales and exchanges, Balancing services, SC-12 Rate 1 interruptible sales and SC-16 require pipeline capacity upstream of CECONY's gate stations in order to command the revenues that they generate.

d. Relationships with Affiliates

Management of the Company's gas-supply assets involves three activities:

- Assigning pipeline capacity to the TPSs who are active on the Company's transmission and distribution systems
- Using the remaining capacity assets to bring the correct amount of gas to the proper city gates
- Placing capacity that is temporarily not required for serving on-system customers into secondary markets.

Conduct of the first of those activities involves relatively little discretion on the part of CECONY's Gas Supply department. How that activity is accomplished is the result of an extended process of working with stakeholders and the NYPSC Staff to develop a process satisfactory to as many of those entities as possible, and that is reviewable to some degree in virtually every rate proceeding that the Company has. Liberty believes that containing any potential for undue influence by an affiliate has been, and will likely continue to be, at least an implicit criterion in the design of the Retail Choice Program. Thus, the capacity-assignment process today is as neutral toward the Company's affiliates as the stakeholder group could make it. Whether for that reason or for others, the Company's retail marketing affiliate, Con Edison Solutions, no longer participates in the Retail Choice Program for gas.

Providing gas supplies to the Company's SBU occupies some of Gas Supply's discretion. The SBU has supply capacity of its own, but it also buys some gas from the Gas Business Unit. There is a rule governing the pricing of those purchases; the SBU pays the market price in the summer, but it pays the average cost of the supply in the winter. This rule implements the frequently-used "asymmetric pricing" guideline for pricing transfers between utility and unregulated affiliates. That guideline provides for transfers at the lower of cost or market. In the summer, when market prices are likely to be lower than fully-allocated costs, the SBU is paying the market price. In the winter, when the market price is likely to be higher than fully-allocated costs, the SBU pays cost.

Beyond the specific rule for transfers to the SBU, Gas Supply is influenced by the margin-sharing in its rates. Described briefly in the previous section, this feature provides that, beyond an initial amount incorporated in its base rates, the Company shares in margins realized from certain activities. Some of those activities involve exercise of the discretion that Gas Supply has in its conduct of the second and third capacity-management activities, bringing the correct amount of gas to the proper city gates, and placing unused capacity in secondary markets.

Two of the Company's competitive-energy affiliates are active in its service territory. Con Edison Solutions sells electricity to industrial and large commercial customers, and also to residential customers, in the northeastern U. S., including customers in the Company's service territory. Con Edison Energy markets the electric production of affiliate Con Edison Development's electricity-generating facilities, and manages the fuel supply for those facilities. It also supplies electricity to wholesale customers, procures electricity for Con Edison Solutions,

and offers plant optimization services to generating facilities in the northeastern U.S. Liberty examined the utility company's transaction records, and found only two secondary-market transaction with either of these affiliates, two capacity-release transactions to Con Edison Energy, that occurred in 2003.

5. Measurement and Balancing

a. Measurement

i. Metering Strategy

CECONY's overall approach to gas measurement is to meter continuously all gas coming into its transmission and distribution systems, and to meter continuously all volumes delivered from those systems to large-volume customers. Volumes entering the systems for cycle-billed customers are the difference between the continuously-metered volumes in and the continuously-metered volumes out. Each pipeline has a meter at the points (gate stations) where it delivers to CECONY. CECONY has "check meters" at each of those points, as well. Any difference of two percent or more between the two sets of readings is investigated and corrected immediately. There are also "gate stations" in the facilities that are part of the New York Facilities Agreement. (These are the "Shared Facilities" discussed above.) CECONY maintains the meters that measure the flows to and from its system at these interconnection points.

Electricity generators that operate behind the Company's city gates and a few other large-volume users have their own contracts for pipeline capacity to those city gates. Their gas is measured by the same pipeline gate-station meters and the same CECONY check meters measuring gas for CECONY's other customers. Thus, no differences are introduced there. Those users are served from CECONY's transmission system, and the Company delivers to them the same quantity, less 0.1 percent for fuel, that it receives for them at the pipeline gate station.

CECONY's liquefied natural gas (LNG) facility at Astoria is also served from its transmission system. Gas delivered to it is metered there. Other Company-use gas (space heating for buildings, etc.) is also metered, not estimated.

ii. Lost and Unaccounted For Gas

The Company considers the difference between continuously-metered volumes into its systems and continuously-metered volumes delivered to its customers (and delivered to or received from the other two LDCs in the New York Facilities Agreement), adjusted for transmission-system fuel, to be gas put into its systems for delivery to cycle-billed customers. It refers to those volumes as "Sendout." The cycle-billed volumes delivered to full-service and Retail Choice customers are referred to as "Sales." Lost and Unaccounted For, referred to by CECONY as "Line Loss," is the difference between Sendout and Sales.

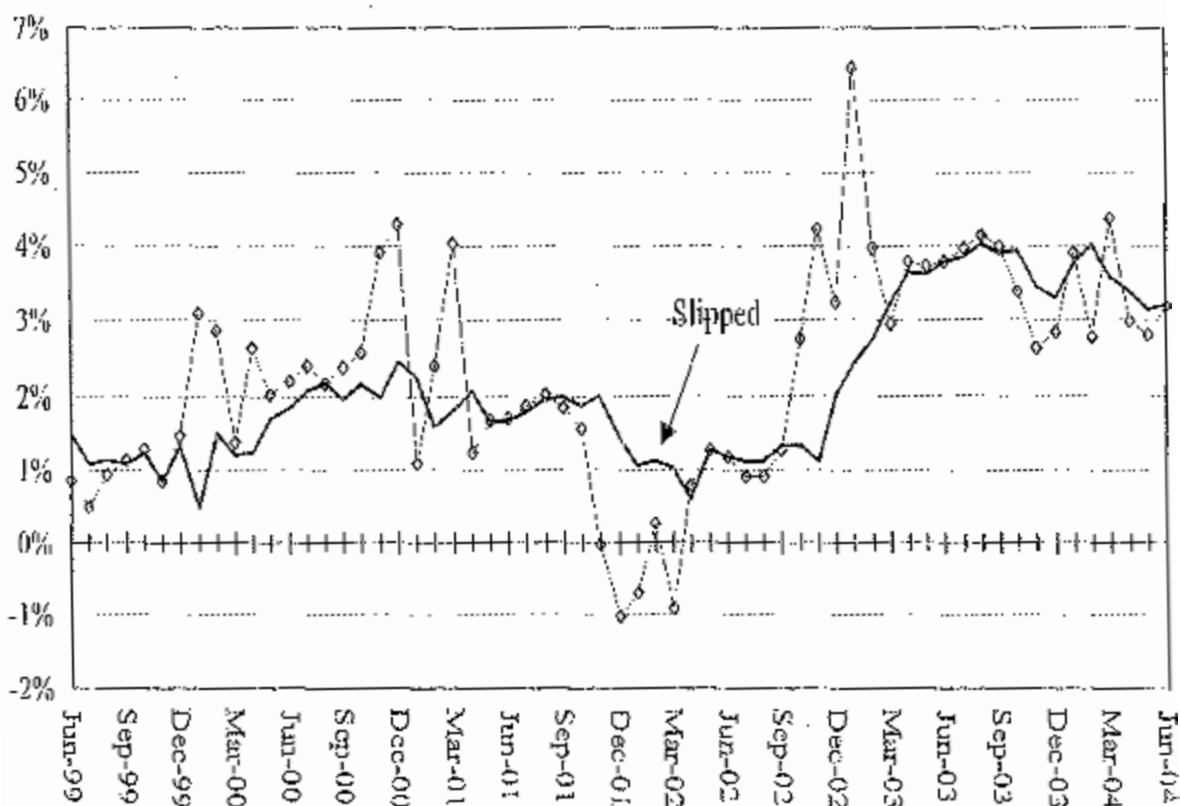
Line Loss is calculated monthly by comparing Sendout to Sales. A 12-month rolling average of Line Loss is developed using the 11 prior months, plus the month for which Line Loss is being calculated.

Imbalances occur at pipeline gate stations, when there are differences between nominated supplies and actual delivered volumes. For continuously-metered customers, imbalances may also occur between the amounts of gas received at gate stations for their accounts, and amounts they take from CECONY's systems at their own meters. For customers who bring their own gas to the gate stations, CECONY measures the quantity that they take out of CECONY's system and compares that quantity to the quantity received for their account at the gate stations. Any difference between those two measurements is dealt with pursuant to the balancing provisions of CECONY's tariff (or pursuant to the customer's balancing agreement if a separate one has been negotiated). The difference between the quantity that the customer nominated to the pipeline, and the quantity received at the city gate for that customer, is a matter to be resolved between the customer and its supplier.

For full-service and Retail Choice customers, the Company must adjust flows to the city gate to match aggregated customer requirements. This adjustment process is accomplished with intra-day nomination changes, plus no-notice transportation and storage services, plus operational balancing agreements with the delivering pipelines. Measured flows into CECONY's transmission and distribution systems, adjusted for deliveries to continuously-metered customers and the other two New York Area LDCs, is the Sendout number that goes into the Line Loss calculation.

The following chart shows how the Company's Line Loss percentage performed over the five years prior to July 2004. In late 2003, observation of the increase seen in the first half of that year led to an investigation. The investigation covered a variety of possible causes of the increase, including possible equipment problems and measurement methods. The procedure for calculating Line Loss was changed slightly as a result of that investigation. In May, 2004, the change in procedure was presented to the NYPSC Staff, and was subsequently incorporated into the Company's 2004 rate settlement.

Line Loss Percentage



b. Balancing

Policies and practices regarding resolution of identified imbalances for continuously-metered customers and for suppliers to the Retail Choice Program are specified in the Company's tariff, or in individually-negotiated balancing agreements for those who seek them. The tariff and the balancing agreements generally provide for daily balancing tolerances, with cash-out for imbalances exceeding those tolerances. The individually-negotiated agreements generally add "banking" provisions that give a customer more time to come into balance. The Company passes along any notifications from the pipelines about reduced balancing tolerances (such as operational flow orders), and the tariff and balancing agreements specify requirements for compliance.

For volumes purchased by CECONY, for full-service customers or the SBU, quantities received under each supply contract are tracked daily. Gas Supply's Gas Billing & Analysis section compares those quantities to the quantities billed by each supplier. The Company pays only for quantities received, plus pipeline fuel.

C. Conclusions

Organization, Staffing and Controls

1. Organization and staffing is commensurate with the mission, goals and objectives of gas-supply procurement groups.

On the basis of Liberty's experience in examining comparable organizations in other large utility companies, the distribution of functions among sections and the staffing of the sections are reasonable.

2. Key managers' experience levels are consistent with those generally found in the industry in similar positions.

The Gas Supply department is organized in a manner that is commensurate with its missions. Staffing levels are appropriate, and individual staff members are well qualified. The basis for this conclusion is Liberty's experience in examining comparable organizations in other utility companies.

3. Coordination within Energy Management is not sufficiently robust. (Recommendation 1)

Given the analogies among the supply problems faced by CECONY's electricity and gas businesses, Liberty can understand why the Company would put the two supply groups, plus capacity planning for both of them, into the same organization, and even locate them in the same space. Liberty believes, however, that there is potential for synergies beyond what has been pursued to date.

For example, Electric Resource Planning is using some capacity planning techniques in its work with the NYISO that should be explored by Gas supply. Electric Resource Planning has undertaken work in analyzing installed capacity reserves as a function of load forecasting uncertainties and loss-of-load probabilities. Clearly, techniques developed for the electricity business do not necessarily translate to gas, and almost certainly will not do so without significant adjustment. The point, however, is that new approaches developed there may suggest applications useful to the gas business. We are also hopeful that increased coordination with Electricity Supply will lead to additional alternatives for bringing firm gas supplies to CECONY's city gates.

As noted in the chapter on Electricity Supply, a considerable portion of CECONY's power purchases for full-service customers is provided by gas-fired generation. That chapter also notes that there is now a growing surplus of generating capacity in New York City, creating a "buyer's market" for power-supply (and capacity) contracting. This circumstance will become even more promising as the EBU's full-service customer load continues to shrink due to customer migration to TPSs.

These circumstances suggest to Liberty that increasing the coordination between Gas Supply and Electricity Supply should occur, in order to promote a continuing search for benefits for both sets of customers. In particular, the complementary needs of the two sets of customers – gas customers' need for supply peaks in the winter, whereas electricity customers' needs peak in the summer – suggest that capacity-sharing arrangements should be possible. CECONY's requirements for both gas supply and electricity supply have special requirements: gas pipeline capacity must have primary delivery-point rights to CECONY's city gates in order to be counted on a peak day, for example, while electricity reliability rules require that a high proportion of

CECONY's electricity supply be located within the City, or be connected directly to the City by a dedicated transmission line. Nevertheless, Liberty believes that increased coordination in the search to fill what are complementary requirements should take place.

4. Gas procurement policies and procedures are consistent with work requirements and procurement and marketing objectives.

Gas Supply recently (2007) had its key work processes reviewed by an outside consultant. Changes were made to improve efficiency, and to reduce the potential for errors.

5. Management/performance audits are conducted occasionally.

Procurement policies and procedures are addressed by Sarbanes-Oxley key controls, so their structure was reviewed carefully from that perspective. Compliance with those requirements is reviewed at least annually. Gas Supply also has written guidelines covering its key work processes. As noted above, Gas Supply has had its key work processes reviewed by outside consultants for adequacy of controls and reduction of errors within the last three years. Some changes were made in response to those reviews.

6. Approval processes are consistent with the magnitude and risk of commitments involved, and with processes applicable to other major corporate commitments.

As noted in the Findings section of this chapter, a Delegation of Authority defines which decisions can be made by officers, and which must go to the Board. Most decisions regarding gas supply procurement are large enough that Board approval is required. For those individual decisions that are not large enough to require Board approval (such as monthly gas purchases), Gas Supply generally presents a plan for approval by the Board, and requests authority to implement the plan.

7. Documentation processes for procurement actions should be adequate to support regulatory oversight and review, but some procedures have not been followed.
(Recommendation 2)

Gas Supply's stated procedures for purchasing gas include documentation requirements that should be adequate to support Internal Auditing and regulatory review. Some of those procedures, however, have not been followed.¹² As discussed in a following conclusion, a more significant concern is that Internal Auditing does not routinely assess compliance with the stated procedures. The procedures (GSG-105) are identified as ones covered by Sarbanes-Oxley documentation and reporting requirements, but full compliance with those requirements is apparently not assessed.

8. Internal Auditing does not routinely examine the award of gas-supply contracts.
(Recommendation 2)

¹² In comments on Liberty's Draft Report, the Company reports that, since the close of Liberty's field work, Internal Audit has completed a review of supply-contract awards. According to the Company's comments, that review found that documentation requirements had been complied with.

The last internal audit of this function was conducted in the spring of 2003.¹³ Liberty believes that this function requires more-frequent audits, in order to assure compliance with Company procedures and to look for any errors or malfeasance.

Supply Capacity Planning

9. Requirements forecasting addresses the entire load duration curve.

As noted in the Findings section, Gas Supply builds up its requirements for capacity from its firm customers' load duration curve, plus the capacity that the Company needs in order to provide the load-following and balancing services that it requires in order to conduct the Retail Choice program, and the balancing services that it offers to interruptible customers and electricity-generation customers. When that built-up capacity requirement is compared to the capacity that is owned by and under contract to the Company ("owned and contracted capacity"), Gas Supply can identify not only any peak-day capacity deficit, but also its shape.

10. The time frames for requirements forecasting accommodate the necessary lead times.

For its annual planning exercises, Gas Supply forecasts its requirements for the coming ten years. While supply projects serving the NYC area typically take a long time from initial conception to initial deliveries, the Company's ten-year forecasts are sufficient for the Company to make tangible assurances of participation as necessary to support project development.

11. Supply capacity planning accommodates the needs of third-party suppliers.

Having the LDCs provide capacity for third-party suppliers has been NYPSC policy since late 2007. CECONY complies with that policy.

12. Capacity planners are aware of potential new markets.

The base load and use factors that Gas Supply uses to forecast capacity requirements have in them the requirements of all firm customers, both those that are served with Company supplies, and those served by third-party suppliers. Those parameters also have in them allowances for new markets that are sufficiently prospective to be included in the load forecasts on which the base load and use factors are based.

13. The set of capacity alternatives used to provide the final increments needed to address extreme load conditions has not resulted from a sufficiently robust consideration of tools that others have found to be useful. (Recommendation 3)

Industry best practice has evolved toward use of probability distributions for input parameters like weather. Under the new approach, historical weather data are analyzed to determine the probability of occurrence of a range of potential design criteria, and then the capacity portfolio is designed to produce the lowest expected value of total capacity costs.

The new approach usually addresses low-probability weather events with non-traditional capacity alternatives, such as purchases of supply from customers who agree to sell their supplies

¹³ As noted above, the Company reported in comments on Liberty's Draft Report that a review was conducted in the last half of 2008.

to the Company under specified conditions, and options on city-gate purchases. An *option* to make a city-gate purchase differs in nature from the city-gate purchase CECONY already makes. Such an option is the right but not the obligation to buy at an agreed price (often the mid-point of a specific index) at certain peak times (*e.g.*, during January on any day where temperatures fall below +5°F). Such an option avoids the buyer's need for the slice of capacity it would have to maintain to meet the specified conditions (in this case particularly cold January days). Should the triggering conditions arise, the option gives the essential equivalent of the required capacity. Depending on option prices, this approach may (as others have found) prove less expensive than holding the additional capacity needed to deal with relatively low-probability conditions.

The price of commodity supply can be quite high under such alternatives. Since the non-traditional alternatives are utilized only rarely, however, they can result in a savings to customers over more traditional alternatives that involve capacity costs that must be paid every year, even though the capacity is used only rarely.

Liberty does not suggest that gas-supply reliability be compromised. Rather, we note that industry best practice has evolved toward new types of capacity alternatives for low-probability events. Users of these new alternatives apply the same types of reliability criteria to their selection as might apply to more traditional ones.

14. Analysis generally focuses on identifying the combination of resources that serves present and anticipated loads at least cost, but efforts to identify alternative sources of supply are not sufficiently broad. (*Recommendation 4*)

One of Liberty's evaluative criteria in the area of supply capacity planning is whether analysis generally focuses on identifying that combination of resources that serves present and anticipated loads at the lowest possible cost. Liberty found that, while the Company's supply planning generally focuses on least cost, the range of capacity alternatives considered does not include some that could further lower costs. This problem is discussed in the next conclusion, and a recommendation is presented below.

As noted above, Liberty has some concerns about Gas Supply's approach to forecasting its capacity requirements. As noted above, Liberty is also concerned about Gas Supply's consideration of alternatives for meeting its capacity requirements. In its current evaluations, Gas Supply is considering only pipeline capacity connected directly to one of its city gates and under contract to CECONY as alternatives to address a perceived capacity deficiency.¹⁴ Delivered peaking services are considered only as temporary measures, to be used only until a "harder" option can be put in place. Moreover, Liberty did not find that city-gate call options; *i.e.*, a right to buy at the city gate at the buyer's option, or buying supply from customers who have their

¹⁴ As noted in Chapter VII, *Load Forecasting*, Liberty is concerned that forecasts are too high. Thus, we do not accept Gas Supply's estimates of a capacity "deficiency."

own gas-supply arrangements, are considered at all.¹⁵ Liberty believes that, for load conditions that occur relatively infrequently, exploration of alternatives such as these is important in developing the most cost-effective portfolio of gas-supply resources.

Commodity Procurement

15. The Company avoids unnecessarily high-cost spot-market supplies.

The Company's contracting processes have evolved with experience. One of the lessons it has learned is the "take-or-release" feature found in a number of its supply contracts. With that feature, for a relatively modest reservation fee, it can acquire options on monthly supplies. If it finds that it does not need part of the supply, it releases that part back to the supplier, forfeiting the reservation fee.

With that feature, the Company has found that it can largely stay out of monthly and daily gas markets. It contracts on an annual or seasonal basis for more gas than it expects to need, then releases excess gas a month at a time. Daily variations are handled with storage injections and withdrawals. Gas Schedulers have the authority to buy or sell daily as necessary to match supplies with customer requirements, but that authority is little used.

16. Types and quantities of supplies bought reflect a crafted strategy.

As discussed in the Findings section, commodity purchases are spread among summer, annual and winter-delivered requests for proposals. The annual RFP solicits offers for one-, three- and five-year terms, in an effort to avoid requirements so large that they affect the market. In the annual RFP in particular, the Company is open to offers at various receipt points across the production areas, in order that it might accept particularly advantageous offers. The Company limits long-term commitments to production area, however, in order to avoid locking in a basis differential that turns out to be too high. These features reflect considerable thought about the Company's approach to commodity purchasing.

17. CECONY uses clear, focused procurement solicitations but has not actively encouraged supplier input on alternative approaches. (Recommendation 5)

CECONY gives considerable thought to the structure and conduct of its commodity acquisition program and activities. Its solicitations are comprehensively designed and conducted in a manner that allows suppliers to respond effectively. However, a material part of effective procurement is the regular securing of information and ideas from suppliers that may improve results from CECONY's perspective. Outreach to the supplier population and occasional conduct of more open-ended solicitations (*i.e.*, ones that invite supplier creativity are means for getting such information effectively. Recognizing that too frequent a use of such techniques can produce supplier "fatigue," Liberty nevertheless did not find such activity by CECONY.

¹⁵ In comments on Liberty's Draft Report, the Company declared that peaking services, which it reports that it has used since 1994, are the same thing as the city-gate call options Liberty refers to. In fact, the peaking services used by CECONY are not the same as city-gate call options currently in use by other electric and gas utility companies in Liberty's experience.

18. The Company promotes identification and use of sufficient numbers and types of vendors.

The Company's supplier-qualification process, described above in the Findings section of this chapter, is fair and is consistently administered.

19. There exist a sufficient number of suppliers identified and pre-qualified.

Gas Supply reports that the Company maintains contracts with 50-60 suppliers. That should be a sufficient number for the size of the Company's requirements.

20. Information regarding identified and pre-qualified suppliers should be kept current.
(Recommendation 6)

As discussed in the Findings section of this chapter, Liberty found several positive indications in this area:

- The Company's supplier qualification process is well-defined and accessible to new suppliers all the time. The Company maintains current contracts with 50 to 60 suppliers at all times, although bidders lists are drawn up for each competition.
- Gas Supply has a separate organizational unit, Gas Billing & Analysis, that is responsible for coordinating and administering all contracts for gas supply and gas delivery capacity (transportation and storage), and keeping them current.

Liberty believes that these activities cover most of the stated criteria. We did not find that financial and credit information for all suppliers is kept current, however.¹⁶ Liberty presents a recommendation in this area.

21. Commodity procurement is conducted pursuant to a well-defined process.

The Company's RFP process is described in the Findings section of this chapter. That process is used for all but occasional daily purchases and sales. Those daily purchases and sales are conducted through phone calls after reviewing price information available from the Intercontinental Exchange (ICE). The Director of Gas Supply informed Liberty that the department is currently setting up to conduct those trades on ICE. Liberty reviewed the RFP materials from one of the Company's procurements. We found those materials to be clear and complete.

22. Bid evaluations are conducted with analytical rigor and without bias.

In reviewing a sample procurement, Liberty reviewed Gas Supply's analysis of the bids. We found that analysis to be objective and well-done.

¹⁶ In comments on Liberty's Draft Report, the Company points out that credit information will be kept current in the Allegro energy transaction contract database. Implementation of the Allegro system was being finalized while Liberty was conducting our field work, during the last half of 2008. The Company also reports that Gas Supply requests that Energy Risk Management provide updated ratings when Gas Supply is preparing RFPs or otherwise reviewing bids.

23. Objectives for purchasing and price risk management are clear, comprehensive and supportive of utility needs.

Application of the provisions of the Company's Delegation of Authority for commitments effectively requires that virtually all decisions about gas purchasing and price risk management be presented to the Company's senior management and its Board of Trustees for approval. Those bodies (senior management and the Board of Trustees) insist that the objectives for these programs are clear and focused on the utility businesses.

Gas Supply also presents its plans for its price risk management activities to the NYPSC Staff each year. The Staff also requires that objectives for those activities are clear.

While the primary objective of the program is minimizing volatility, a secondary objective is price management. When prices are high relative to recent history (prior two to four years), Gas Supply may change financial instruments (use options rather than instruments that fix the price). When prices are low, additional quantities are hedged. These strategies are consistent with what the Company and the PSC believe are the preferences of firm sales customers, namely, to be protected from upward movements in gas prices, but to participate in downward movements.

24. There is a strong focus on liquid, transparent markets in gas procurement and price risk management.

In its solicitations for gas supplies, the Company requires that offers of supply be priced with respect either to published price indexes (typically *Inside FERC Gas Market Report* first-of-the-month indexes) or closing prices on the New York Mercantile Exchange. Those prices are readily accessible, and trading volume can be obtained to ensure liquidity.

For the Company's hedging activities, the principal instruments are futures and options. Futures contracts are, again, the ones traded on the NYMEX, so prices and liquidity are apparent. Some options are also bought on the NYMEX, but others are bought in bilateral transactions. When that occurs, the Company is usually buying a "NYMEX look-alike," so its price and trading volume are readily available by checking the NYMEX.

25. Price risk management is conducted pursuant to established and enforced policies and procedures.

The Company has a well-defined energy risk-management structure, including an Energy Risk Management group whose job is to enforce the Company's risk-management policies and procedures. In response to a recommendation by the Company's external auditors, the ERM group reports to a different vice president from the one who is responsible for the risk-management activities.

The ERM group was constituted in 2001, and its first task was to develop the policies and procedures which it now administers. Very few violations of those policies and procedures occur. When they do, the violations are typically about credit limits. When violations happen, they are reported to the Regulated Risk Management Committee, along with a report on the actions taken in response to the violation.

26. Gas Supply makes sufficient use of experience to refine its price risk-management strategies.

A significant portion of the work of the Gas Hedging & Market Analysis section is “back-casting” different aspects of its hedging program in an effort to improve outcomes of the program going forward. Different combinations of key parameters – schedule (when to buy), instrument (options or futures) and quantity (how much to buy) – are tested under recently-experienced market conditions to determine what combinations of those parameters would have yielded the best outcomes in terms of volatility and price to customers. Succeeding years’ programs are “tuned” based on the outcomes of the back-casting exercises.

27. Gas Supply has not demonstrated sufficient interest in assessing its own performance.
(Recommendation 7)

Gas Supply reports that it participates in industry surveys, but shows little interest in any evaluation of its own performance. Gas Supply’s Key Performance Indicators focus on compliance with procedures. Compliance with procedures is important, but does not answer the question of whether the department is doing as good a job as it could.

One indication of the lack of sufficient self-assessment is illustrated by those instances (discussed elsewhere in this chapter) where CECONY’s Gas Supply department did not appear to have considered the applicability of some analytical techniques or had not tried some approaches to gas-supply problems that Liberty has found in use elsewhere. Liberty believes that an important part of the reason for this is that the department makes so little effort to assess its own performance. If Gas Supply was interested in performance, it would find out who does things best, and how they do it. Liberty has made particular recommendations for the areas in which our experience tells us that Gas Supply could do a better job, but we also recommend that the department initiate a self-assessment effort aimed at finding other ways to improve.

Capacity Management

28. The interests of on-system customers are prominent drivers of policies and procedures for operation of the Company’s gas-supply portfolios, but the Company has not fully considered whether use of an third-party asset manager would yield more customer benefits. *(Recommendation 8)*

The framework in which Gas Supply conducts supply portfolio capacity management activities assures that on-system customers’ interests are a prominent consideration in operation of its supply capacity assets. Liberty found no reason to believe that any other consideration is a major factor. We are concerned, however, that a different approach to capacity management might yield more benefits to on-system customers.

Liberty observes that, from time to time, firms in the asset-management business have contacted the Company regarding the possibility of entering an asset-management relationship. The Company advised Liberty that it has generally not pursued these inquiries, due to concerns about the impact of external asset management on operating flexibility, and about application of certain provisions of interstate natural gas pipeline regulation.

Liberty further observes that the U.S. Federal Energy Regulatory Commission (FERC) has recently clarified its regulations that impact these relationships. Moreover, Liberty is finding a growing realization among industry observers that asset-management relationships can provide benefits to on-system customers that go beyond what distribution companies are able to provide.¹⁷ External asset managers can often get more out of an asset portfolio through using: (a) a particular company's supply-asset portfolio as part of a broader network of supply assets in ways that lower costs, and (b) supply assets to engage in types of transactions (such as storage arbitrages) that are not suitable for utility companies.

Liberty acknowledges the company's concerns about reliability. Liberty observes, however, that many gas distribution companies, including ones in the New York City Area, have utilized asset-management arrangements without incident. In fact, it is possible to argue that the broader array of supply assets that the asset manager brings to the relationship actually enhances reliability.

Liberty also acknowledges the Company's concerns about operating flexibility. Liberty believes, however, that a fair test of whether the Company's concerns can be effectively addressed will only come through solicitation and examination of competing proposals from prospective asset managers.

29. The TPS program is administered fairly and efficiently.

The design of the Company's Retail Choice Program clearly reflects the considerable effort invested in it by the Company, its stakeholders and the NYPSC Staff. Liberty reviewed the marketers' web site and the Operating Procedures Manual used in administering the Program, and found them to be quite satisfactory. The ultimate proof, however, is participation. The following table, taken from the Company's Migration Reports to the PSC, demonstrates how the program has grown.

Combined Gas Marketer Statistics by Year

Calendar Year	# of Marketers	Annualized Load (Dth)	Total Customers
2007	29	41,076,880	130,474
2006	28	26,735,672	113,474
2005	25	21,602,587	60,654
2004	23	16,731,327	25,156
2003	24	15,742,564	20,914

30. Unused supply-capacity assets could be marketed more aggressively. (Recommendation 8)

The Company's activities in marketing unused supply-capacity assets reflect considerable thinking about to whom the unused assets might have value, how to make contact with those

¹⁷ See, e.g., National Regulatory Research Institute, *Are There Some Gas Utility Functions that Others Can Do Better? The Cases of Capacity Management and Gas Procurement*, February 10, 2009.

potential buyers, and how to estimate what the assets might be worth to those buyers. Liberty's concern is that the thinking is constrained by a too-narrow view of what assets could be made available, and how they could be used to generate value in secondary markets. As a consequence, the margins realized seem low in comparison to other companies in Liberty's experience of comparable size. To address this concern, Liberty recommends that the Company explore external asset management. Details of our recommendation are presented below.

31. Portfolio performance has been consistent with supply plans and supply-asset specifications.

The Company reports that all gas-supply assets have been performing in accordance with plans and specifications.

32. Inquiries into supply-asset failures have not been necessary.

The Company advised us that all gas-supply assets have performed as expected within the last five years.

Measurement and Balancing

33. Metering strategies are designed to maximize reliance on measurements.

As noted in the Findings section of this chapter, the Company's approach to measurement is to meter continuously all gas coming into and going out of its transmission and distribution systems. All Company-use gas is metered, not estimated.

34. Metering strategies and their implementation identify imbalances unambiguously.

The Company employs measurements in all processes that affect identification of imbalances. Those measurements, plus the way that they are used, allow imbalances to be identified unambiguously.

35. Balancing strategies and practices are fair to all customer classes.

Liberty's opinion, which has been developed through experience with comparable companies, is that these strategies and practices are fair. Liberty believes that these strategies and practices are one of the "fringe benefits" of the hard work done by the Company and its stakeholders in collaborative meetings intended to improve the Company's Retail Choice Program

367. Metering and testing programs conform to industry standards.

The Company's meter maintenance and testing programs have all been reviewed and approved by the NYPSC.

37. Balancing practices are cost-based, and encourage minimization of assets required for balancing.

The Company's approach to balancing does not distinguish between assets required to provide load-following service and those required to provide balancing services. As used by the Company, load-following is meeting the daily increases or decreases in firm customer load from

the average daily delivery each month; balancing is matching quantities delivered to the gate stations with quantities required by customers. CECONY uses storage and peaking services, plus intra-day nomination adjustments and no-notice transportation and storage services, to provide both services.

In theory, the load-following and balancing services could be distinguished, and different sets of assets used to provide each. If that could be done, the two types of services could be priced separately, based on the cost of providing each one. In practice, however, the Company has found that any such distinction would depend on somewhat arbitrary judgements about how much of each asset was used to provide each service. Thus, the Company's approach has been to study forecasted versus actual demand over recent winters, and to contract for enough resources to accommodate the forecasted-versus-actual difference in the aggregate, whether due to load-following or balancing. Liberty views this approach as sufficient.

D. Recommendations

Organization, Staffing and Controls

1. Make finding means for increasing interdepartmental coordination an Energy Management priority. (Conclusion 3)

Energy Management must find ways to get its departments to share knowledge and expertise. A first step in pursuit of such sharing could be an off-site meeting in which the each of the department directors and their section managers simply reported to their counterparts in the other departments on the issues that they are facing.

2. Provide for more regular examination of Gas Supply's award of supply contracts by Internal Auditing. (Conclusions 7, 8)

Not every competition needs to be audited, but all competitions should be examined on a sampled basis to assure that procedures, including documentation requirements, are being followed, and that awards are being made on the grounds that Gas Supply says that they are.

As noted in the Findings section of this chapter, gas purchasing is identified as a process to which Sarbanes-Oxley requirements apply. As also noted above, the company has assured us that compliance with Sarbanes-Oxley procedures is audited annually. Yet when we requested audits of the award of gas-purchase competitions, we were advised that the one conducted in the spring of 2003 (covering gas purchases in the winter of 2001/02) was the only one that had been done in recent memory.

Supply Capacity Planning

3. Explore applying probability-of-occurrence analysis to its supply-capacity planning. (Conclusion 13)

The basic method for this type of analysis is presented in the Company's response to DR #1015, cited above. The analysis produces a probability distribution for the parameter of interest, the average of hourly temperatures at the Central Park Observation Station for the peak day, and the number of heating degree-days in the design winter or design year for that criterion. The

application of this technique that is most familiar to Liberty produces a probability distribution for annual degree-days. Application to capacity planning then involves identification of capacity alternatives available at each increment of probability of occurrence, with the cost of each alternative. The capacity-planning problem is to assemble the mix of capacity alternatives that provides the requisite capacity at the lowest expected total cost. For most weather conditions, the best mix will include conventional pipeline capacity, storage and peaking; as the probability of occurrence declines, however, our experience suggests that delivered alternatives, such as options giving the right but not the obligation to make city-gate purchases, will be the most cost-effective.

Implementation of this recommendation would have little incremental cost, as it would involve re-focusing the efforts of current employees. The potential benefit of implementing the recommendation is postponing further commitments to new supply projects. Gas-supply requirements for other classes of customers, such as electricity generators and the Company's Steam Business Unit, may continue to increase, and the Gas Supply department may need to continue pursuing new supply projects in order to serve those requirements. The question is for whom is the additional capacity being sought.

Liberty is aware that other New York City-area utilities (National Grid New York and National Grid Long Island, in addition to CECONY) also use the 0° Fahrenheit criterion for their design-day, though they apply it somewhat differently. Liberty believes that potential savings from application of a revised approach may be realized by CECONY.

4. Expand Gas Supply's range of potential capacity alternatives as it considers firm customers' peak-day requirements for supply. (Conclusion 14)

Gas Supply must expand its thinking about acceptable alternatives for peak-day capacity as it considers firm customers' requirements. Given CECONY's location among a variety of potential sources of supply, there is no reason, in our view, that supplies delivered to CECONY's city gates should not be considered to be as reliable as gas purchased at some upstream point and transported to CECONY's city gates, on pipeline capacity under contract to CECONY. Also, given the abundance of gas-fired electricity generation capacity in the greater New York City Area, and the tendency of requirements for that capacity to peak in the summer, whereas firm gas customers peak in the winter, a variety of capacity-sharing arrangements should be possible. The perception is that, to date, electricity generators serving New York City have relied on released-firm or interruptible pipeline capacity for their gas-supply requirements. What merits exploration now and on a continuing basis, however, is whether, in a dynamic marketplace, some entities may be open to capacity-sharing arrangements.

The first step is for Gas Supply to identify delivered peak-day capacity alternatives with reliability that is comparable to "conventional" alternatives. Given the abundant city gates on multiple pipelines that serve the New York City Area, it makes sense to determine whether such alternatives exist.

Once an adequate array of capacity alternatives has been identified, the next task is to study where they fit into a least-cost mix. Our experience tells us that, just as storage alternatives are more economic than pipeline capacity for seasonal requirements, delivered supply alternatives,

including call options on peak-day purchases, will be the most economic choices for low-probability load conditions.

Commodity Procurement

5. Conduct occasional Gas Supply outreach and tests to identify potential additional types of supply arrangements. (Conclusion 17)

As with the discussion of capacity alternatives in the previous recommendation, Liberty believes that the Company should seek supplier input in a more structured fashion, and allow on occasion for non-traditional alternatives for commodity, as well as for capacity. Our experience teaches us that markets occasionally think of things that company personnel do not, and that some of those things are useful. We do not have a particular recommendation regarding the type (or types) of non-traditional procurements that the Company should try; rather, our sense is that, through dialogue with suppliers and other LDCs, and through the occasional less-structured solicitation, the Company should be more open to things that it did not think of.

6. Keep financial and credit information for gas suppliers current. (Conclusion 20)

Energy Risk Management's Energy Credit Procedures are clear for the Company's counter-parties for financial transactions, and processes for monitoring the status of the Company's relationships with those counter-parties are clear. Liberty did not find evidence of comparable attention to financial and credit information for suppliers of physical gas.¹⁸

Credit issues are different for suppliers of physical gas, as CECONY will usually owe them, rather than them owing CECONY. Credit status is important for physical suppliers, as well as financial ones, as the occasional imbalance will require resolution, and the Company needs to be assured that suppliers can continue to perform. If there are any unanswered questions about a supplier's ability to perform, financial or otherwise, personnel responsible for commodity procurement will tend to discount that supplier's offers,¹⁹ which may result in passing over an attractive offer.

The Company's stated supplier qualification process, described in the Findings section of this chapter, does not mention credit evaluations, although Liberty expects that such evaluations are part of the supplier-qualification process. (If not, they certainly should be.) The point here, however, is that keeping that information current is a continuing process, and someone should be tasked to do it.

7. Find specific, objective ways for Gas Supply to evaluate its own performance. (Conclusion 27)

A possibility for such evaluations is benchmarking its performance against that of comparable companies. Benchmarking parameters could include ones like unit commodity costs, unit capacity costs, realizations from secondary-market activities, etc. An important first step is identifying comparable companies; utility companies in upstate New York are not likely to yield

¹⁸ As noted earlier, the Company reported in comments on Liberty's Draft Report that this recommendation is being implemented as part of implementation of the Allegro energy-transaction tracking system.

¹⁹ See, e.g., the Company's response to DR #535.

good comparisons. There are a number of companies in the down-state New York, western Connecticut and northern New Jersey areas that should yield better comparisons.

Company personnel must also find ways to better inform themselves of recent developments in analytical approaches and techniques. Liberty provided the Company with an initial list, drawn from our experience, of companies that are more advanced in these areas. Gas Supply can also familiarize itself with the capacity planning work of the NY ISO to observe application of some of the techniques in that setting.

Capacity Management

8. Solicit proposals for external asset management. (*Conclusions 28, 30*)

Liberty understands the Company's concerns that various aspects of its operations, including operating its Retail Choice Program, will limit the potential benefits of external asset management. Liberty is unimpressed, however, with the Company's efforts to work through those concerns objectively. Thus, Liberty recommends that the Company undertake a more-formal evaluation process, and then present a report to the NYPSC on the results of its assessment.

The process should begin with a presentation on operation of its transmission and distribution systems, and its Retail Choice Program, to interested and qualified asset managers. Candidate asset managers must be allowed to ask questions about the Company's systems and operations, and to have their questions answered honestly and objectively. This first phase should conclude with submission, by interested and qualified asset managers, of conceptual proposals for asset-management arrangements.

The Company should analyze the conceptual proposals. If the Company believes that none of the proposals offers benefits to customers that are superior to what the Company is providing or can provide, it should present a report to the NYPSC explaining its reasoning. Copies of the conceptual proposals received should be part of this report.

If, on the other hand, the Company feels that one or more of the conceptual proposals has merit, it should proceed with a formal competition. To initiate the competition, the Company should clearly articulate what type(s) of arrangements it is soliciting, and what criteria it will apply in making a selection.

Upon completion of this phase, the Company should report to the NYPSC. Its report should describe the competition that it conducted, and its results. The report should include

- Copies of the request for proposals, and any other materials furnished to prospective proposers
- Copies of all proposals submitted, and any communications from potential proposers explaining why they did not propose if they were qualified to do so
- Copies of any internal evaluations by the Company of proposals received.

Liberty would expect that the proposers and the Company would request that all materials submitted remain confidential, and that the Commission would honor their request.

Appendix A: Recommendations Summary

This Appendix summarizes, by chapter, each conclusion that lead to a recommendation and each corresponding recommendation.

Chapter One

None.

Chapter Two

None.

Chapter Three

Conclusions:

1. **CECONY has a clearly defined corporate mission statement but lacks a statement of vision.** *(Recommendation 1)*
2. **Business Unit plans and their use are not sufficiently similar in format and content to promote integrated planning.** *(Recommendation 1)*
3. **There is not effective integration of business-unit plans at the top level.** *(Recommendation 1)*
4. **The supporting documentation for the projects in the business plans is not referenced to the plans and is inconsistent in content and format.** *(Recommendation 1)*
5. **CECONY performs other activities that comprise elements of effective creation and use of plans, but does not integrate them fully into its planning process.** *(Recommendation 1)*
6. **The Strategic Planning group has not had a clear, consistent purpose through the period following divestiture and restructuring.** *(Recommendation 3, 4)*
7. **The ERM process is still in the rudimentary phase and is not incorporated into the planning and budgeting process.** *(Recommendation 2)*
8. **CECONY generally operates in a reactive mode.** *(Recommendation 5)*
9. **CECONY lacks sufficient clarity in its long-term “vision” for the infrastructure necessary to move effectively, efficiently, and flexibly into an uncertain future.** *(Recommendation 5)*

Recommendations:

1. **Improve the planning process.** *(Conclusions 1, 2, 3, 4, 5)*
2. **Take the ERM process associated with operating risks to the next level.** *(Conclusion 7)*
3. **Define the role of the Strategic Planning Unit.** *(Conclusion 6)*
4. **Revisit the subjects investigated by the interdisciplinary teams.** *(Conclusion 6)*
5. **Develop a comprehensive vision and 20-year master plan for the electric system.** *(Conclusion 8, 9)*

Chapter Four

Conclusions:

1. **The Board's committee structure addresses oversight of construction program planning and execution, but not in a manner that optimizes its role in program planning and monitoring.** *(Recommendation 1)*
2. **The Board's members have strong capabilities and the Board has shown a commitment to assuring that it maintains the expertise needed to meet the financial and network spending challenges that will drive much of the Company's activities in the coming years.** *(Recommendation 2)*
5. **The Board generally reviews construction program planning and execution, and has established committees with responsibilities that focus on key aspects of that program, but the size and complexity of CECONY's infrastructure warrant more structured involvement.** *(Recommendation 3)*
6. **During this audit, the Board demonstrated a commitment to augmenting its role in construction program planning and execution.** *(Recommendation 3)*
8. **The Board gets substantial information about adverse events affecting network operation and demonstrates significant interest in those events; however, the information that it routinely receives is not consistent in format or in substantial depth.** *(Recommendation 1)*
10. **The Company makes a comparatively strong commitment to operations auditing but has opportunities to strengthen its contribution to network-related construction and operations effectiveness and efficiency.** *(Recommendation 4)*
11. **Internal Audit has begun to use the ERM program's identification of risk in audit planning; that use should be complemented by a more focused examination of capital**

and O&M cost risks and how operations auditing can address them effectively.
(*Recommendation 5*)

Recommendations:

1. **Revise Board Committee Structure to better coordinate functions and to focus on infrastructure planning, oversight, and performance measurement.** (*Conclusions 1 and 8*)
2. **Continue efforts to identify board candidates with energy utility experience.** (*Conclusion 2*)
3. **Incorporate changes in management's form and schedule for infrastructure planning and budgeting into a more structured, resequenced, and more intensive regimen of board review.** (*Conclusions 5 and 6*)
4. **Increase emphasis on efficiency and effectiveness in operations auditing.** (*Conclusion 10*)
5. **Make consideration of Enterprise Risk Management a more structured part of audit planning.** (*Conclusion 11*)

Chapter Five

Conclusions:

7. **The design of the annual bonus plan is complicated and over-emphasizes meeting CECONY's O&M budget at the expense of other, important measures.** (*Recommendations 1 and 2*)
8. **The structure of the long-term incentive program re-emphasizes Con Ed's over-focus on meeting the expense budget.** (*Recommendation 2*)
9. **Neither the annual cash bonus nor long-term incentive plans put enough compensation at risk or have enough stretch.** (*Recommendation 1*)
10. **The bonus and long-term incentive plans both allow for much exercise of the board's and management judgment.** (*Recommendation 1*)

Recommendations:

1. **Increase the amount of stretch and put more pay at risk as part of a broad revamping of incentive compensation.** (*Conclusions 7, 9, and 10*)

2. **Before the study is done and implemented, reduce the emphasis on O&M expense and increase the weighting for capital expenditure performance and the operating performance measures.** *(Conclusions 7 and 8)*

Chapter Six

Conclusions:

2. **The KPI system platform has limited functionality.** *(Recommendation 1)*
4. **CECONY does not have a comprehensive, corporate-wide integrated system of performance measurement.** *(Recommendation 1)*
5. **Business unit managers use their own sets of performance indicators to manage their operations.** *(Recommendation 1)*
6. **CECONY's corporate performance indicators place insufficient emphasis on longer term performance.** *(Recommendation 1)*
7. **CECONY's limited, general comparisons with other utilities may be comforting but provide little useful information.** *(Recommendation 1)*

Recommendations:

1. **Develop a corporate-wide management information system.** *(Conclusions 2, 4, 5, 6, 7)*

Chapter Seven

Conclusions:

2. **Total staffing levels in the key forecasting functions are adequate, although there may be opportunity to reallocate staff among load forecasting tasks and products.** *(Recommendation 1)*
8. **Peak-load forecasting for gas needs a different approach.** *(Recommendation 2)*
9. **Throughput-volume forecasts for gas display problematic results.** *(Recommendation 3)*
13. **The use of 25 years of sales data for forecasting the next five is not forward-looking.** *(Recommendation 3)*
14. **CECONY's long-term forecasts prepared 5 and 10 years ago demonstrate a consistent pattern of a 5 percent to 10 percent under-estimation of peak load, calling into question the degree of under-estimation in current forecasts.** *(Recommendation 3, 4)*

18. CECONY performs little or no sensitivity analyses, probabilistic assessments or other consideration of uncertainty in load forecasting. *(Recommendation 5)*
19. Documentation and communication regarding the criteria and assumptions used in load forecasts and the factors that drive forecasts can be improved. *(Recommendation 6)*
26. CECONY load forecasting processes make no use of CECONY load research data, suggesting a lost opportunity for potentially significant improvements in quality and cost effectiveness. *(Recommendation 7)*
28. Goals for DSM targeted to specific networks represent a small percentage of the system peak demand. *(Recommendation 8)*
29. CECONY's load relief program and resulting construction needs receive no benefit from the Company's load curtailment programs. *(Recommendation 9)*
30. CECONY's load forecasting efforts are focused on history, short-term events and mechanical processes with insufficient attention to long-term considerations that might have a quantum impact on demand. *(Recommendation 10)*

Recommendations:

1. Analyze, and redirect as appropriate, the level of effort and sophistication applied to various load forecasting tasks and products, to better balance costs with product and user needs. *(Conclusion 2)*
2. Find a better way to forecast growth in the peak gas load. *(Conclusion 8)*
3. Conduct an R&VF review of certain aspects of its approach to forecasting. *(Conclusions 9, 13, 14)*
4. Evaluate the factors responsible for consistently under-estimating 5 and 10 year peak load forecasts; assure that any bias is removed from future forecasts. *(Conclusion 14)*
5. Expand load forecasting activities and capabilities to encompass analysis of uncertainties using sensitivity analyses, probabilistic tools or other applicable techniques. *(Conclusion 18)*
6. Develop an improved approach to the documentation, testing, and communication of forecast criteria and assumptions. *(Conclusion 19)*
7. Examine and implement as appropriate the efficiencies and quality improvements that might result from utilization of CECONY's load research program, modified as cost-effective, to support load forecasting. *(Conclusion 26)*

8. **Aggressively move forward with the major study planned by Market Research on efficiency potentials and include a special focus on efficiencies that can be targeted to specific networks.** *(Conclusion 28)*
9. **Evaluate options to enable the consideration of current and future load curtailment initiatives, both at CECONY and NYISO, for dependable network demand reduction.** *(Conclusion 29)*
10. **Establish a structured approach to the consideration of long-term eventualities that might significantly impact load forecasts, such as changes in trends, new technologies and new policies.** *(Conclusion 30)*

Chapter Eight

Conclusions:

3. **Ongoing maintenance programs and targeted reliability programs should be adequate to maintain system equipment integrity; however some programs produce decreasing reliability benefits per dollar expended.** *(Recommendation 1)*
6. **The 138 kV system designed to N-1 standards is not analyzed to prevent maintenance difficulties from a design basis.** *(Recommendation 2)*
8. **The criteria used by CECONY for the design of its transmission system conform to all national, regional, and state reliability organizations; however the determination of transfer levels used when analyzing line out conditions need to be clarified.** *(Recommendation 3)*
14. **There are inconsistencies with the data used in the calculation of equipment rating data.** *(Recommendation 4)*
16. **Deficiencies in network and distribution planning models and software have been identified; they are being addressed.** *(Recommendation 5)*
17. **No analysis that determines what 3G initiatives must be accomplished by what date has been performed in order to minimize costs to customers.** *(Recommendation 6)*
19. **Reduction of peak losses is not sufficiently considered in the planning process.** *(Recommendation 7)*
20. **Sectionalization of network feeders warrants further investigation.** *(Recommendation 8)*
22. **There is not consistent conformity across regions with the new distribution trimming standards.** *(Recommendation 9)*
23. **The 100 percent inspection program of distribution trimming prior to payment is not achieving desired results.** *(Recommendation 10)*

24. There is no base reliability design level for networks. (Recommendation 11)

Recommendations:

- 1. Evaluate reliability programs to determine if they should be terminated earlier to release capital expenditures for more cost effective reliability programs. (Conclusion 3)**
- 2. Analyze the 138 kV system designed to N-1 standards to determine the extent that maintenance activities can be performed at load levels less than peak load; where appropriate, incorporate maintenance design requirements into relevant design standards. (Conclusion 6)**
- 3. Clarify transmission planning criteria with regard to determination of transfers used during second contingency analysis. (Conclusion 8)**
- 4. Perform a global review of all equipment ratings, input data, and time durations across the distribution and transmission areas to assure consistency and to justify and document differences. (Conclusion 14)**
- 5. Maintain the 2011 completion date for completion of network secondary topology updates and EPRI DEW software. (Conclusion 16)**
- 6. Perform a least cost system analysis that minimizes costs to customers with regard to implementation of 3G strategies. (Conclusion 17)**
- 7. Perform analyses to determine if peak demand can be reduced more economically than the addition of infrastructure. (Conclusion 19)**
- 8. Actively pursue the economic use of SCADA controlled network mid-point feeder sectionalizing switches or circuit breakers to reduce system investment. (Conclusion 20)**
- 9. Place all distribution tree trimming under a central corporate management function with accountability to corporate management. (Conclusion 22)**
- 10. Strengthen the distribution vegetation management inspection program with accountability. (Conclusion 23)**
- 11. Establish a base level of network reliability for new networks. (Conclusion 24)**

Chapter Nine

Conclusions:

- 6. CECONY does not maintain the information it will need to make future evaluations of main replacement. (Recommendation 1)**

- 16. Corporate planning does not advise Gas Engineering of major changes in the business environment that may impact gas-system planning. (Recommendation 2)**
- 18. Gas-system planners know when major new loads might impose costs on the system that would be inconsistent with rate design. (Recommendation 3)**

Recommendations:

- 1. Maintain current information about CECONY's leak-prone pipe. (Conclusion 6)**
- 2. Evaluate potential changes in the business environment for each of the businesses; for the GBU, Strategic Planning should advise Gas Engineering regarding potential demands on the gas transmission and distribution systems occasioned by those changes. (Conclusion 16)**
- 3. Report to stakeholders and the NYPSC on any expansion of the transmission and distribution systems required to serve winter-period electric power generation. (Conclusion 18)**

Chapter Ten

Conclusions:

- 4. CECONY has not formally identified a master plan for its steam business unit. If the steam resource plan is to be considered a comprehensive master plan, it lacks sufficient focus on proactively addressing safety issues as well as potential upcoming environmental mandates and an expanded focus and input regarding the needs of the steam transmission and distribution system. (Recommendation 1)**

Recommendations:

- 1. Identify a Steam Master Plan and incorporate within it a greater emphasis on what is happening on and to its distribution system. (Conclusion 4)**

Chapter Eleven

Conclusions:

- 3. Annual electric rate cases have supplanted the CECONY budgeting processes for the 2008 and 2009 budget years. (Recommendation 3)**

4. CECONY executive management does not set long-term plans, goals and objectives for reliability and infrastructure investment that can be linked with the annual budget process. *(Recommendation 1)*
6. Capital projects and programs are analyzed and prioritized using different methods and processes in each major organization. *(Recommendation 2)*
7. CECONY does not have a common, company-wide analysis system to evaluate and allocate projects based on their long-term economic value. *(Recommendation 2)*
8. Longer-term reliability and infrastructure projects can be "crowded out" of the capital budget by shorter-term priorities, or not proposed. *(Recommendation 4)*
16. CECONY's capital re-allocations in response to budget over-runs can cause infrastructure and reliability projects to be cancelled or delayed without board of trustees consent. *(Recommendation 5)*
17. The company does not have informational feedback loops in place to evaluate the quality of project analysis and prioritization efforts. *(Recommendation 6)*

Recommendations:

1. Strongly link CECONY's long-term electric plan with annual budgets, rate plans and 5-year capital plans. *(Conclusion 4)*
2. Establish consistent, company-wide economic value analysis methods and metrics for capital projects and programs. *(Conclusions 6 and 7)*
3. Work toward the re-establishment of multi-year electric rate cases. *(Conclusion 3)*
4. Prioritize CECONY capital projects and allocate funding using long-term economic analysis metrics as a significant decision factor. *(Conclusion 8)*
5. Require changes in capital projects and programs (with a total cost of greater than \$10 million or and/or an annual budget of greater than \$5 million) of more than 20 percent from the annual budget to be approved by the board of trustees. *(Conclusion 16)*
6. Establish formal informational feedback loops for project analysis and project prioritization. *(Conclusion 17)*

Chapter Twelve

Conclusions:

Cost Management

1. **Con Edison management has defined cost management as an important part of its corporate strategy, but the formal supporting structure and program are not in place to allow that priority to play out in day-to-day operations.** *(Recommendations 1, 4)*
3. **Workforce management reports have many charts and tables, but contain little in the way of analysis or recommendations for dealing with cost variances** *(Recommendation 1)*
5. **Con Edison's cost support groups are capable at fulfilling the requirements and expectations of the current cost management approach.** *(Recommendations 2, 3, 4)*
6. **Con Edison can achieve substantial cost benefits by a shift to a formal program of cost management featuring a structure that places a high priority on effective cost management and an action-oriented emphasis on analysis and corrective action.** *(Recommendations#1, 4)*

Work Planning

6. **Criteria for optimal fleet size are not established.** *(Recommendation 1)*
9. **The same work management processes are used in a project environment in a consistent manner. However, the significant Cost overrun of several mega projects against the original or appropriation estimates caused major concerns among stakeholders.** *(Recommendation 2)*

Resource Management

3. **There is a lack of long term resource capability analysis.** *(Recommendation 1)*
5. **Assessments of productivity and cost impacts due to the replenishment of retired workers by trainees are not being performed.** *(Recommendations 1 and 2)*
6. **Con Edison has a strong safety program, but recent fatalities, the post-accident actions of the Company, less-than-aggressive safety goals and continuing management / union contention raise effectiveness concerns.** *(Recommendations 4, 5, 6)*
7. **The OSHA incident rate for Gas Operations (excluding Gas Engineering) is trending higher.** *(Recommendation 3)*
8. **While contractor safety programs may be consistent with Con Edison requirements, there have been cases of inadequate implementation and enforcement.** *(Recommendation 7)*
9. **Overtime is consistently exceeding 20% over the past three years and does not appear to be under control.** *(Recommendations 1, 9, 10)*
11. **The contractor workforces are generally efficient as there are many unit costing contractors and fixed price contractors. However, for better utilization of internal**

resources, resource analysis should be performed continuously at the local levels to levelize peak periods. *(Recommendation 1)*

12. Con Edison has no articulated strategy or specific policies on balancing in-house and contractor resources. *(Recommendation 8)*

Performance Measurement

1. The assessment of cost savings or cost avoidance on continuous improvement initiatives is inadequate. *(Recommendation 1)*
2. There is a disconnect in the perception of a continuous improvement culture between the senior management and the working level personnel. *(Recommendation 1)*
3. None of the business units has productivity as a pay-for-performance goal. *(Recommendation 2)*
4. There is little documentation on the implementation and effectiveness of lessons learned. *(Recommendation 3)*
5. The Quality Assurance Program is effective. However, the QA acceptance rates are trending poorly. *(Recommendation 5)*
9. There is no substantive effort at internal benchmarking. *(Recommendation 3)*
10. There is limited participation in external data sharing and less in external benchmarking. *(Recommendation 4)*

Recommendations:

Cost Management

1. Implement a holistic approach to cost management that is designed and built around three key elements: (a) a guiding philosophy; (b) a formal, structured cost management plan; and (c) building blocks of comprehensive supporting capabilities *(Conclusions 1, 3, 6)*
2. As skilled people represent the cornerstone of the holistic approach, expand the role of cost management professionals to encompass tasks and accountabilities important to holistic cost management. *(Conclusion 5)*
3. Establish a cost support organization that is (a) placed consistent with the priority of cost management; (b) serves the cost management needs of all levels of management; (c) develops a force of skilled cost professionals and assures those skills are continuously improved; and (d) has overall accountability for the development and implementation of the cost management program. *(Conclusion 5)*

4. **Provide training for managers, supervisors and cost support personnel in cost management techniques consistent with the holistic approach.** *(Conclusions 1, 5, 6)*
5. **General Recommendation Implementation Guidance.**
6. **Sample Cost Management Implementation Tactics.**

Work Planning

1. **Establish fleet size criteria based on historical data on total vehicle usage hours versus total physical work performed in hours in the region for each vehicle class.** *(Conclusion 6)*
2. **Perform in-depth reconciliation on cost estimates with substantial overrun to better understand the root causes of deviations.** *(Conclusion #9)*

Resource Management

1. **Perform comprehensive resource analysis for all business units on a quarterly or semi-annual basis.** *(Conclusions 3, 5, 9, 11)*
2. **Assess and monitor the productivity and cost impacts of carrying an extra trainee on some work crews on a continuous basis to achieve more efficient resource management.** *(Conclusion 5)*
3. **Conduct a root cause analysis of the upward trend in OSHA target rate in Gas Operations and prepare and implement a corrective action program.** *(Conclusion 7)*
4. **Review the roles of management, the Board and/or its committees after serious events such as the 2008 electrical fatalities.** *(Conclusion 6)*
5. **Increase efforts to segregate safety from contractual issues in management / bargaining unit dialog.** *(Conclusion 6)*
6. **Review safety targets with the objective of adapting “stretch,” but attainable, levels that exceed historical averages.** *(Conclusion 6)*
7. **Strengthen enforcement of contractor compliance with their safety programs.** *(Conclusion 8)*
8. **Establish a corporate philosophy, policies and supporting guidelines for the balancing of in-house and contractor resources.** *(Conclusion 12)*
9. **Establish a corporate philosophy, policies and supporting guidelines to provide managers and supervisors with a framework to manage overtime.** *(Conclusion 9)*

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- 10. Prepare an analysis of corporate overtime expenditures that includes root causes of the upward trends and strategies for attaining more economic levels. (Conclusion 9)**

Performance Measurement

- 1. Advance the continuous improvement efforts under The Way We Work program. (Conclusions 1, 2)**
- 2. Include pertinent productivity improvement goals in future KPIs at various management levels. (Conclusion 3)**
- 3. Implement a formal program for representatives from each region to share lessons learned in their respective fields. (Conclusions 4, 9)**
- 4. Participate more actively in external information sharing efforts. (Conclusion 10)**
- 5. Perform analysis on work items with unacceptable QA rejection rates to isolate performance problems. (Conclusion 5)**

Chapter Thirteen

Conclusions:

Central Operations

- 3. Large projects are provided with dedicated support resources, but lessons from past project close-out reviews consistently indicate that these resources may not be adequate. (Recommendation 1)**
- 6. Some of the philosophies, principles and methods of holistic cost management are not being applied in the project environment. (Recommendation 2)**
- 18. The construction program provisions for the collective management of small projects do not make fully-effective use of the project management principles used on large Central Operations projects. (Recommendation 3)**

Electric Operations

- 1. A project management program is in place, but it does not address all of the elements of project management. (Recommendation 1)**
- 2. A team of project managers is not in place. (Recommendation 2)**
- 4. The project management principles that are being applied to significant O&M efforts could be improved with the use of a work management system tool. (Recommendation 1)**

5. **Formal approval and kick-off of projects is not permitted without a reasonably firm scope definition, but the cost estimate is generally only an order of magnitude estimate.** *(Recommendation 1)*
6. **Some of the philosophies, principles and methods of holistic cost management are not being applied in the project environment.** *(Recommendation 3)*
7. **Cost management plans for major components of the work are not in place.** *(Recommendation 2)*
9. **A program of scope control that identifies scope deviations early and analyzes and mitigates their effects is not in place.** *(Recommendation 2)*
13. **The role and responsibility of the project manager is not clearly defined and understood throughout the organization.** *(Recommendation 2)*
14. **There are no consistent expectations for project managers in place.** *(Recommendation 2)*
15. **Project management requirements for project participants are not generally consistent across all projects.** *(Recommendation 2)*
16. **There is linkage between project management and the budgeting systems, but the linkage is not very clear.** *(Recommendation 1)*
18. **There is no written provisions for the collective management of small projects.** *(Recommendation 2)*

Recommendations:

Central Operations

1. **Improve resource planning for design personnel and other essential project personnel.** *(Conclusion 3)*
2. **Bring a corporate total holistic approach to cost management to the project and program management efforts.** *(Conclusion 6)*
3. **Strengthen Substation Operations program management processes by adding project management principles in a structured way.** *(Conclusion 18)*

Electric Operations

1. **Implement a work management system in Electric Operations.** *(Conclusion 1, 4, 5, 16)*

2. **Design and implement written project and program management procedures and expectations, including definitions of roles, responsibilities and expectations, cost control plans, and scope control procedures.** (*Conclusion 2, 7, 9, 13, 14, 15, 18*)
3. **Implement a corporate total holistic approach to cost management.** (*Conclusion 6*)

Chapter Fourteen

Conclusions:

1. **The Chief Distribution Engineer needs a project support/specialist to assist in coordinating and executing the main replacement, reinforcement, and other distribution engineering capital projects or programs.** (*Recommendation 1*)
2. **The project scope documents for gas capital projects do not give sufficient details that address the risks and rewards of the project or provide alternatives that were evaluated and not chosen.** (*Recommendation 2*)
3. **CECONY has an insulated corporate culture that undervalues the potential for learning best practices from others.** (*Recommendation 3*)

Recommendations:

1. **Staff a project coordination/specialist group under the Chief Distribution Engineer to assist in the execution of distribution capital projects such as the main replacement program.** (*Conclusion 1*)
2. **Improve and expand the current project scope documentation to add sections on risks and rewards and alternative methods.** (*Conclusion 2*)
3. **Start benchmarking with other urban utilities and utilize what these other utilities are doing better to improve the CECONY program and project management of capital projects.** (*Conclusion 3*)

Chapter Fifteen

Conclusions:

1. **Central Operations Procedure (COP) 10-0-5 meets the requirements of project management process phases, but needs to provide further specificity for application to most steam distribution projects.** (*Recommendation 1*)

3. **Steam Distribution Operations personnel do not receive sufficient training in work management principles and in applicable elements of COP 10-0-05.** *(Recommendation 2)*

Recommendations:

1. **Identify projects requiring the application of project management techniques through a more formal, structured process.** *(Conclusion 1)*
2. **Train steam distribution operations personnel in work and project management techniques.** *(Conclusion 3)*

Chapter Sixteen

Conclusions:

2. **Opportunities to consolidate the electric and gas financial hedging activities have not been realized.** *(Recommendation 1)*
3. **CECONY does not have a comprehensive and structured approach with clear goals and objectives for electricity-supply “portfolio design.”** *(Recommendation 2)*
4. **The performance measurements for energy management provide incentives for only a portion of appropriate electric supply goals and objectives.** *(Recommendation 3)*
7. **CECONY’s planning for electric supply procurement is not sufficiently long term to capture the load requirements and resources past 2012.** *(Recommendation 2)*
8. **Efforts to identify alternative sources of capacity and energy have not been fully analyzed or documented.** *(Recommendation 4)*
9. **CECONY’s examination of new capacity resources and markets to meet its NYISO ICAP requirements has not been sufficiently aggressive.** *(Recommendation 4)*
11. **CECONY has not recently explored economically buying out its high-priced NUG contracts.** *(Recommendation 4)*
14. **CECONY’s price risk management (hedging) program is consistent with NYPSC requirements for reducing price volatility.** *(Recommendation 2)*
17. **CECONY Internal Auditing has not tested the electric procurement decisions and decision-making processes with sufficient frequency.** *(Recommendation 5)*
20. **Electric procurement operations do not have comprehensive and clearly documented policies and procedures.** *(Recommendation 6)*

Recommendations:

1. **Consolidate duplicative Energy Management operations in the electric and gas hedging functions.** *(Conclusion 2)*
2. **Develop a comprehensive portfolio management plan with quantified goals and objectives to optimize the electric resource portfolio and related hedging plans.** *(Conclusions 3, 7, 14)*
3. **Revise the performance measures (KPIs) for energy management to provide metrics and incentives that align with electric procurement objectives.** *(Conclusion 4)*
4. **Identify, analyze and document all reasonable alternatives to its existing sources for both capacity and energy. Alternatives that are superior to the status quo electric resources should be implemented.** *(Conclusions 8, 9, 11)*
5. **Internal Auditing should schedule more frequent audits of electric procurement decisions, documentation for entering into electric supply contracts, and daily purchase decisions.** *(Conclusion 17)*
6. **Document processes, procedures, and guidelines for electric supply and scheduling, and for the 20 percent purchase flexibility in electric hedging.** *(Conclusion 20)*

Chapter Seventeen

Conclusions:

3. **Coordination within Energy Management is not sufficiently robust.** *(Recommendation 1)*
7. **Documentation processes for procurement actions should be adequate to support regulatory oversight and review, but some procedures have not been followed.** *(Recommendation 2)*
8. **Internal Auditing does not routinely examine the award of gas-supply contracts.** *(Recommendation 2)*
13. **The set of capacity alternatives used to provide the final increments needed to address extreme load conditions has not resulted from a sufficiently robust consideration of tools that others have found to be useful.** *(Recommendation 3)*
14. **Analysis generally focuses on identifying the combination of resources that serves present and anticipated loads at least cost, but efforts to identify alternative sources of supply are not sufficiently broad.** *(Recommendation 4)*
17. **CECONY uses clear, focused procurement solicitations but has not actively encouraged supplier input on alternative approaches.** *(Recommendation 5)*

- 20. Information regarding identified and pre-qualified suppliers should be kept current.**
(Recommendation 6)
- 27. Gas Supply has not demonstrated sufficient interest in assessing its own performance.**
(Recommendation 7)
- 28. The interests of on-system customers are prominent drivers of policies and procedures for operation of the Company's gas-supply portfolios, but the Company has not fully considered whether use of an third-party asset manager would yield more customer benefits.** *(Recommendation 8)*
- 30. Unused supply-capacity assets could be marketed more aggressively.** *(Recommendation 8)*

Recommendations:

- 1. Make finding means for increasing interdepartmental coordination an Energy Management priority.** *(Conclusion 3)*
- 2. Provide for more regular examination of Gas Supply's award of supply contracts by Internal Auditing.** *(Conclusions 7, 8)*
- 3. Explore applying probability-of-occurrence analysis to its supply-capacity planning.** *(Conclusion 13)*
- 4. Expand Gas Supply's range of potential capacity alternatives as it considers firm customers' peak-day requirements for supply.** *(Conclusion 14)*
- 5. Conduct occasional Gas Supply outreach and tests to identify potential additional types of supply arrangements.** *(Conclusion 17)*
- 6. Keep financial and credit information for gas suppliers current.** *(Conclusion 20)*
- 7. Find specific, objective ways for Gas Supply to evaluate its own performance.** *(Conclusion 27)*
- 8. Solicit proposals for external asset management.** *(Conclusions 28, 30)*